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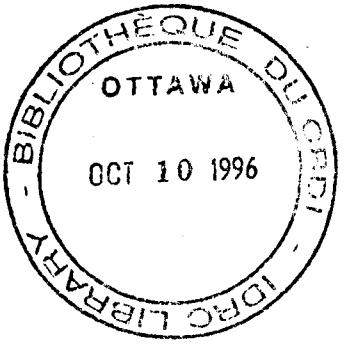

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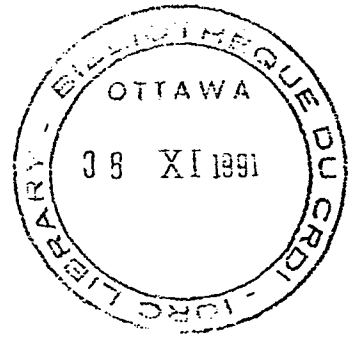
Edited by
Tina Wallace with Candida March



OXFAM

THE INVOLVEMENT OF AGROPASTORALIST WOMEN IN LIVESTOCK PROGRAMMES

CLARE OXBY

There is an increasing realisation that women play an important role in animal production: not only in dairying, but also in the marketing of dairy products, and in a whole range of animal husbandry activities, including the herding and watering of livestock, and caring for sick and young animals. The sexual division of labour, however, varies considerably from society to society: amongst the Twareg of Central Nigeria, for example, milking is seen as a man's job. In agropastoral societies, women may be performing duties related to animal production in addition to much of the agricultural work.

When planning interventions in agropastoral societies, therefore, it is of vital importance to know about the local division of labour; firstly, in order to target programmes to the people who are used to doing the job, and secondly, in order to gauge the impact of the programme on all members of the community, not just the participants. Specifically, we need to ask if women in the community are being expected to take on increased duties in addition to their normal routine of childcare, domestic water and firewood fetching, and, in many cases, animal production and agricultural chores; and are these extra tasks manageable?

There is plenty of rhetoric within non-governmental organisations (NGOs) about the need to involve women in all their programmes, at every level of decision making, and at every stage in the process of programme design and implementation. Some NGOs specifically mention agropastoralist women in this respect but, despite the rhetoric, the impact so far in terms of carrying out interventions is meagre. If agropastoralist women are involved at all, it is usually not in relation to animal production activities, but to other activities, such as primary health care, literacy, and handicrafts. For example, a consultant's report on the involvement of agropastoral women in Oxfam's Affolé Project, Mauritania, proposes project components for women, not in livestock-related production activities but in literacy,

human health, and improved stoves — even though it is clear from the same document that women play an important role in animal husbandry (Oxfam Mauritania, 1988, p.24-27).

The main exception to this is dairy projects; in Western eyes, milking and the processing of milk products is an acceptable, even traditional, occupation for women. This attitude on the part of donors and planners is being reflected in a few African NGO programmes for agropastoralists. For example, ACORD's Mali programme has involved some women in the Unité Laitière Coopérative de Tin Hama. On the whole, however, such projects involve women as workers rather than decision-makers; the latter are nearly always men.

If the impact of the rhetoric on the type of projects which are being implemented is meagre, the same cannot be said about data collection in connection with NGO programmes. A number of NGOs are attempting to fill their information gap on agropastoralist women by commissioning special studies, with a view to using the findings in the planning of a further phase of programme activities: Mali: ACORD programme (ACORD, 1987); Sudan: ACORD Red Sea Hills Programme (McEwan, 1988); Kenya: Oxfam and ITDG Turkana Waterharvesting Project (Watson, 1988); and Mauritania: Oxfam Affolé programme (Oxfam Mauritania 1988).

In addition, Oxfam's Gender and Development Unit (GADU) has issued several articles by Oxfam staff on agropastoralist women in a number of the countries in which Oxfam operates: Erigavo, Somalia (Sulekha Ibrahim, 1987a; 1987b); Central Somalia (Graham, 1988); Turkana, Kenya (Watson, 1987; 1989); and Eritrea (Burgess, 1987). ACORD organised a workshop on Pastoral Systems and Social Change in Mogadishu in October 1988 at which two relevant papers were presented: one on the situation of ex-herder women in settled areas of Somalia (Fouzia Mohamed Musse, 1988); and the other on women's role in the Somali pastoral economy and related development issues (Amina H Adan, 1988).

There is thus increasing evidence that in agropastoral societies, women may be performing duties related to animal production, in addition to much of the agricultural work. Moreover, the by-products from their agricultural work may provide valuable nutritional supplements for the household animals. While not implying that we have sufficient information on such issues, this is one gap which is beginning to be filled.

The situation with regard to involving women in the subsequent processes of project planning and implementation, however, is far from satisfactory. One explanation is the inevitable time-lag between the data collection stage and the planning and implementation stages; and one can only hope that the next generation of livestock projects will reflect more closely, and build upon, knowledge of the division of labour operating in these societies which has now been collected. Another reason is the cultural constraints operating on many individual donors and planners. Although they may hold the most open-minded and radical views on other subjects, some people have, at the same time, highly unrealistic and stereotyped ideas on what women's role in society is and should be. They react in a deeply conservative and negative way when it comes to absorbing and acting on the results of recent research about women's roles in agriculture and animal husbandry, proposing and implementing improvements to women's lives, or even merely counteracting the damaging impact on women of recent changes in society.

One way to combat this is to create or strengthen special units (e.g. Oxfam's Gender & Development Unit) or special posts (e.g. ACORD's Women in Development Officer) at the NGO head-quarters, and to ensure that the organisation gives them wide support in translating the results of research on women's roles in agricultural production into project activities for women. This means encouraging such staff to comment on projects which do not have a special women's component, not just on those which do; for it is precisely in the former that gender issues may have been overlooked.

Following are brief descriptions of two rare NGO projects which have attempted to involve women in animal production activities. Both are restocking projects, and further project details are available in the full reports.

Kenya: Restocking projects (Wajir, Isiolo, Turkana and Samburu Districts) Oxfam

In Wajir, the restocked families were all headed by women; either widows or women whose husbands could not support them. In Isiolo, 8 of the 36 beneficiaries were women heads of household. In addition, there was a stipulation that each married man receiving stock would brand 10 for his wife or wives, who would retain this

share in the event of divorce (this was not enforced by project staff). In Turkana District, 14 out of 50 beneficiaries were women; and in Samburu District, 17 out of 53 were women (10 of these were actually Turkana women, but living in Samburu District). In other words, about a quarter of beneficiaries were women in Isiolo and Turkana, and about a third in Samburu.

Although people said how well the restocked women were doing, in fact the flock performance figures do not show any statistically valid difference between the restocked men and the restocked women. The projects' evaluator explains this attitude to women's performance as surprise that women are performing well at all. She does point out that many women are in a more vulnerable social and economic position than men, particularly women who find themselves without a husband for a variety of reasons.

Mali: Programme d'apui aux actions associatives et coopératives (Timbuktu and Gao Regions) ACORD

The latest phase of this programme is targeting women for some of the restocking activities. In Gourma Rharous Cercle, Timbuktu Region, 30 of the 85 families restocked by September 1988 were female-headed. In Gao Region, there are separate restocking initiatives for men and for women; women beneficiaries are members of already existing women's groups in Menaka Cercle and in Bourem Cercle. So far, two women's groups in each district have been allocated small stock, together with a fund to contribute towards animal health and herding costs (ACORD 1988). Restocking is carried out in these projects in a rather different way from most other restocking projects, since the animals remain in a collective herd until they are fully repaid, rather than being transferred to the beneficiary's herd at the time the loan is agreed. ACORD has also taken the important step of recruiting a local coordinator of all the project components affecting women, in both regions where the programme is operating.

Recommendations

There is a continuing need for more data on the role of women in animal husbandry in specific societies and regions, and the impact of programmes on the community as a whole, not just the participants. For example, are some responsibilities in animal husbandry being taken away from women as a result of project

activities directed towards men? We are starting to get some of this data, but the need is still great.

A distinction needs to be made between women who are dependents in households, as wives, daughters, mothers, or other relatives, and women who are heads of households. They are likely to have different roles in animal husbandry, and to need different types of support from NGOs. Female-headed households are becoming increasingly common, and especially so in some of the deprived communities in which NGOs find themselves working; men may be absent for long periods, or permanently, when they take up paid employment in the towns or when they are involved in fighting civil wars. Refugee camps are notorious for the proportion of female-headed households; husbands and fathers may be away tending livestock, on paid labour elsewhere, fighting, or dead. In Sablaale Settlement Scheme, Sablaale District, Somalia, for example, 25 per cent of households are female-headed. In such circumstances, women may be taking on extra responsibilities in animal husbandry, and this should be taken into account when planning livestock programmes.

The water-harvesting project, Turkana District, Kenya (Oxfam and ITDG) aimed to improve local techniques of rainfed cultivation through the construction of earthworks with draught animals. Initially, the project worked with men only, but after realising that women were in a majority in the food-for-work groups from which participants were recruited, the balance was redressed; by 1987, the majority of those selected for training in water-harvesting were women. The work of women was no longer limited to earth-moving, but included also surveying and construction control; and a quarter of the project staff were women (Cullis, 1987:6).

It makes sense to focus project activities for women around the more productive activities in which they are already involved. This should apply whether women are taking major herd management decisions as female heads of households, or helping with subsidiary tasks such as the care of young or sick animals. Supporting their contribution to animal husbandry will probably do more to revive the local economy than teaching new skills such as embroidery or even horticulture. Furthermore, it is often inappropriate to direct such activities as literacy, human health and hygiene, and family planning, exclusively to women: men may also be involved in taking decisions about such subjects and therefore the activities

should in many cases be directed to men as well. All too often such activities are seen as the obvious means for NGOs to support women, whilst more productive activities are reserved for work with men. The time has come for a change, in response to the actual roles of men and women.

When introducing new technology in animal husbandry, for example in animal health or dairy processing, it is important to teach women as well as men, so that women do not end up being excluded from such activities, or merely providing the labour while the men take the decisions. Women should be involved, where appropriate, in decision making and managerial work.

The phrase 'cultural constraints' is often used as an excuse for not directing project activities towards women. One should ask what are the specific cultural constraints in the community in question and, at the very least, try to tackle them. One should also remember that many African societies are undergoing profound changes at the moment, including cultural changes, and attitudes to women's roles may also be changing. One should also ask who precisely feels these constraints, in order to make an appropriate response: is it all of the community, or is it particular individuals? Could it be some of the project personnel?

Depending on what exactly the problem is, and who feels it, different measures may be adopted. Would special women's projects be more acceptable than trying to involve women side by side with men? Would recruiting female project staff help? Would clearer messages to men about proposed activities with women help? Would a concentration on what are locally considered to be subsidiary animal husbandry activities rather than major herd management activities make a women's livestock programme less threatening? Or a concentration on small stock rather than large stock? The programme should be flexible enough to adapt to the particular local situation.

Existing women's groups may be used as an institutional channel for project activities with women. This is the approach that has been taken recently by ACORD in their Mali programme, so far successfully. It is also possible that ACORD's Sablaale Settlement Scheme for agropastoralists in Somalia, may be able to work through established groups. Surveys have pinpointed two types of groups which may be of relevance for future programme design: labour groups for agricultural operations, and savings groups to

pool money (Spooner, 1989; El Bushra 1986).

Traditional women's livestock inheritance mechanisms may be used as a model for stock loans to women. In many livestock-keeping communities, women may hold stock in their own names, and pass the progeny down to their children. Some of these forms of ownership and inheritance have been eroded in the past few decades, as a result of the emphasis put on 'Western', male-dominant patterns. Even if these female-focused institutions are no longer operating, members of the community are likely to remember them. The Twareg are familiar with such a form of matrilineal inheritance of livestock, which was widespread until recently, and is still practised to a limited extent in some communities to this day. It is known by different names in different Twareg communities: one name is *akh-idderan* or 'living milk' (Oxby, 1987). In the area where ACORD is operating in Mali, this same institution is known as *ebatekh* (reported by Halatine, 1989). ACORD is considering this inheritance mechanism with a view to using it as a model for their women's restocking programme (Roche, 1989).

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6

THE SOCIAL ORGANIZATION OF PRODUCTION IN COMMUNITY-BASED AGROPASTORALISM IN THE ANDES[1]

María E. Fernández

Smallscale community-based farming systems are geared primarily to self-sufficiency, at least insofar as food is concerned. Production over and above the needs of household consumption and social exchange is marketed to obtain basic goods, services, and farm inputs. The Andean community-based farm unit controls land through usufruct rights, inheritance, sharecropping, rental, or any combination of these. Production activities are carried out with tools and animals that belong to the household or are borrowed from other households through reciprocal agreements (Williams 1982:382). Access to capital depends not only on the farm unit's productive capacity, but also on market conditions that provide terms of trade favorable enough to permit the unit's acquisition of necessary inputs. In most cases, however, these resources are strictly limited by ecological, political, and economic conditions over which the household has little control (Shanin 1982:238).

Smallscale production systems tend to be labor intensive. Workers must be on hand throughout the year, but especially at labor peaks in the production cycle. In such systems this factor is critical, since all farms are subject to similar labor demands during the same periods; yet neither wage labor nor the cash with which to pay for it is readily available. Indeed, the organization of available labor to meet cyclical production demands is a major challenge to the smallscale system (McCorkle this volume, Perevolotsky this volume).

Over time, high-altitude farming communities of the Andes have designed socio-organizational strategies for managing their natural resources and their agropastoral production vis-à-vis their ecological and economic constraints. One strategy is communal management of natural resources to ensure equitable

access by all households. Another is the optimization of labor through inter-household labor exchanges. A third is the maximization of technological knowledge and skills by distributing decision-making and task performance among gender and age groups (Fernández 1988). These organizational strategies involve people in communal, interhousehold, and specialized management and cooperative task arrangements.

The interaction between community resource management and farm unit production management makes community-based agropastoral systems qualitatively different from mixed, independent household farms, who exercise almost total individual control over their natural and productive resources. A different conceptual and methodological framework is therefore necessary to comprehend the complex interactions of community-based systems. This chapter outlines one such framework, drawing upon SR-CRSP research between 1983 and 1988 in highland *comunidades campesinas* (legally recognized 'peasant communities') of the Aramachay area, Department of Junín, Peru. Although the data presented here are site-specific, 68% of all such communities in Peru have similar ecological and production characteristics (Jamtgaard 1989).

ARAMACHAY AGROPASTORALISM

The nine comunidades campesinas of the Aramachay area are located at altitudes between 3500 m and 4000 m on the western slopes of Peru's Mantaro Valley. The communities average 65 member-households each, with a range of 38 to 120; the average household size is six. In all the communities, grazing grounds and croplands are highly diverse, with soils that vary from fair to poor in quality. The recuperation of soil micro-organisms depleted by cultivation is slow, requiring fallow periods of two to seven years (Mayer 1981:41). Climatic conditions such as limited water availability, irregular precipitation, and frequent frosts and hail make farming a high-risk endeavor. Agropastoral production is carried out by the farm unit. The unit may consist of a single household or of two to five cooperating, related households. This unit is its own primary source of labor; hired labor is uncommon. Cropping and stockraising activities are shared by all members of the unit, depending on the requirements of the two sectors. Farm units typically control 1 to 6 ha of arable land for cropping, with a fourth to a half of this in fallow at any given time. Dryland farming is the norm. In only one of the nine communities do a few farms (less than 5%) have minuscule plots of irrigated land, where fodder is grown. The other eight have only enough water for human and animal consumption.

Each farm unit raises roughly a dozen different crops on an average of 28 dispersed plots ranging from an eighth to a fourth of a hectare each, with different soil characteristics and slope gradients. The principal crops include tubers (potatoes, *mashua*, *oca*, *olluco*), grains (barley, wheat, oats, *quinua*), and in a few cases maize. Species and varieties are frequently intercropped (Salvatierra 1985:3). They are selected for their adaptability to climatic conditions as well as for their multiple uses in human and animal nutrition. Most production is destined for on-farm consumption and for meeting obligations to kin residing in the community or in regional or national urban centers. Potatoes constitute the main cash crop, although some barley is also marketed. Barley chaff and other grain byproducts are stored as animal fodder for the dry season.

Livestock species are likewise selected for multiple uses. Sheep are the most important, followed by cattle, donkeys, swine, and guinea pigs. With the exception of the guinea pig, nearly all animals are of *criollo* breeds, adapted during and just after the Spanish conquest. Herds average about 25 sheep, two head of cattle, one donkey, and three swine. Oxen and donkeys are used for farm traction. Both sheep and cattle furnish manure for fuel and fertilizer. Sheep provide wool for clothing and bedding, and are sold sporadically, either on the hoof or slaughtered, when cash is needed. Guinea pigs are raised primarily for consumption during festivals and for ethnomedical uses.

The agricultural and pastoral sectors are closely interrelated and interdependent. In the harsh high-altitude ecology of the Andes, production depends on a rational and efficient use of all natural resources. Mantaro Valley communities devote about half of their exploitable territory to cropping and about half to grazing, thus ensuring a resource base for both plant and animal production (Fernández et al. 1986:24). Herds graze communal rangelands and crop stubbles as well as fallow plots. Crop residues and natural pastures account for the total sheep diet. Barley and oats are used to supplement the diet of cattle, as well as for household consumption. Manure from the household herd is employed as fertilizer. It is accumulated in corrals and then applied to fields at planting time. It is also added to croplands as animals graze fallow fields and stubbles throughout the year. In areas like Aramachay, where vegetation is scarce and agrochemical inputs are expensive, manure is the main source of fertilizer.

This mixed farming regime promotes the maximal use of natural resources. Furthermore, crop diversification and multi-species stockraising reduce and redistribute risks. However, of equal importance to these technoenvironmental strategies are the socio-organizational strategies that community-based agropastoralists of Aramachay employ to manage their complex and uncertain production environment.

THE ORGANIZATION OF PRODUCTION IN ARAMACHAY

Community Management of Natural Resources

Multiple plant and animal species, the small size of agricultural plots, and multi-household use of rangelands make production efficiency a matter of community management. Due to ecological constraints and the limited scale of production, independent farm unit decisions as to natural resource use in certain

realms could bring about rapid resource depletion, both as a result of conflicting interests and dissimilar management practices. For these reasons, from pre-Colombian times forward, Andean communities have developed systems of communal resource management that guarantee each household fairly equitable access to the farm plots, pastures, water, and fuel required for successful agropastoralism.

These systems are overseen by the community assembly, which is composed of one voting representative from each member-household (the father or, in his absence, the mother) and run by an elected council. To determine how a resource should be used, by whom, and when, the community assembly names a committee to conduct a study. The committee's findings are presented to the assembly for general discussion, and the most beneficial action is agreed upon. A second committee is then named to implement the decision and oversee the procedures. When an action requires labor, all households are expected to participate in communal workparties or *faenas*, with each contributing an agreed-upon number of workdays. Households who do not respect the assembly's decisions are sanctioned.

The assembly carries out activities relating to natural and other resources that benefit all member-households, such as planning sectoral fallow systems, allocating controlled communal grazing plots for oxen, and raising communal herds and crops. The following examples are illustrative. In 1988 the community of Miraflores reallocated community land after a 15-year hiatus. Croplands were reassigned to take into account young households with no access to farm plots, thereby restoring an equitable balance of the principal resource for cultivation. As late as 1976 the community of Llacuaripampa still designated which crops could be planted by farm units in each of four cropping zones within its territory, in such a way as to control insect and pest infestation. One community, Cruz Pampa, manages its scarce water resources by permitting member-households to obtain water only during a two-hour period daily. Another Aramachay community assigns each household two trees per year to be cut for fuel so as to forestall wanton exploitation of forestry resources.

The assemblies of all nine communities in the area limit the number of animals that each household may graze on communal rangelands, thus warding against the depletion of forage resources and subsequent erosion. All Aramachay communities also maintain centrally located, communal grazing areas to provide oxen with additional fodder during planting and harvesting, when the animals' workload is greatest and they have less time and strength to reach more distant pastures. In addition, several communities maintain communal herds and/or agricultural plots to raise funds for the community treasury.

In sum, the assembly manages natural resources so that each household can access the soil qualities, grazing lands, and water to produce the variety of plants and animals necessary for self-sufficiency (Mayer 1981:62).

Labor Exchange Among Farm Units

Although the community assembly sets the basic management criteria and distributes resources among its member households, the farm unit is responsible for organizing the workforce for its own production activities. The community-based smallscale farm largely relies upon its own labor. However, at peak labor times it resorts to interhousehold reciprocal exchanges. In the cropping sector, for example, four to six men of different families may form a group to work together on a rotating basis in each others' fields during plowing, harvesting, and threshing. In the livestock sector, women herd other household's flocks on stipulated days each week or when emergencies or cropping, marketing, and other tasks arise. These arrangements help overcome farm labor shortages (McCorkle this volume). For example, they allow women to free themselves from herding when products must be taken to market; and men can rely on exchange labor when large quantities of grain must be threshed quickly to avoid damage from rain.

Interhousehold labor exchange groups may be composed of relatives, fictive kin, or neighbors (Collins 1986:660). Termed *ullay* in the Aramachay area, these exchanges tend to be longterm, stable arrangements, although shortterm exchanges for specific tasks such as house-raising are also common. The men or women who work together in a labor exchange group tend to share similar technological experience and production objectives. However, these groups do not operate under a hierarchical system. Rather, each member implements her/his own technology, replicating technical and organizational practices in the farms or herds of all involved. There is no supervisor, and the choice of technical practices is a matter of group consensus.

Gender-Related Decisionmaking and Task Distribution

Agropastoral farming in highly variable ecologies calls for vast bodies of biological and technical knowledge both for planning and implementing production. The complexity of mixed farming systems in the Andes has led to a division of production responsibilities among the adult members of the farm unit such that men have greater responsibility for the agricultural sector, and women for the pastoral (Deere 1983). Decisionmaking and technical specialization are closely related. Among Andean agropastoralists, women usually have more expert knowledge of animal husbandry, especially livestock reproductive capacity, health, and nutrition. Hence they can offer the production unit more precise technical information in this sector; for example, when and which animals should be purchased or culled so as to best serve the unit's needs. Conversely, men tend to specialize in cropping. They therefore have greater knowledge of soil quality and rotation patterns in varying plots and can offer better information on cultivation potentials when seasonal cropping plans are being considered. This kind of specialized, technical knowledge gives the "sector

managers" the right to participate actively in their farm unit's larger decision-making processes (Fernández 1988).

A distinction must be drawn here between decisions that span *both* the crop and the livestock sector and affect planning for the farm unit as a whole, versus daily management decisions within sectors. In the former, all adult members are involved, regardless of gender. For example, decisions concerning longterm objectives such as educating children, building a house, or acquiring equipment must be discussed by all adult members of the farm unit. This longrange planning must take into account not only the specialized technological knowledge of the unit's sector managers but also its aggregate supply of land, capital, and labor. To illustrate, if the purchase of an ox is proposed, the crop-sector manager must demonstrate the need for this agricultural input, while the livestock-sector manager must evaluate the availability of forage and supplements with which to feed the animal. Yet together *both* must decide on the source of cash with which to make the purchase, e.g., the sale of potatoes or of sheep. In contrast, management decisions within sectors need not always be discussed. For example, the unit's crop manager may unilaterally determine when to weed and what types and quantities of pesticides to apply to fields. Likewise, the livestock manager selects which products to buy for curing a sick animal and which sheep to put up for sale.

In other words, there is considerable independence within sectors when decisions are based on technical knowledge and skills alone. But decisionmaking within the community-based farm unit is never totally independent, because the interaction of the two sectors and the resources to support them must be considered jointly. This means that, in order to contribute to decisions that affect the production unit as a whole, sector managers must have at least a general working knowledge of all other components in the agropastoral system.

This knowledge is gained through an apprenticeship process in which children take part from an early age. Girls begin herding at their mothers' sides at age six or so, when they begin to learn about varying qualities of range, types of forage, diagnosis and treatment of different animal diseases, and other husbandry information and practices. At the same age, boys begin cultivating alongside their fathers and other elder males. But boys also herd when needed, and girls help out with planting and harvesting. In this manner, although girls specialize in animal husbandry and boys in cropping, both grow up with a general knowledge of techniques used in the sector for which the other gender is responsible.

This knowledge will be put to good use in the future, since adult women and men have well-defined roles to play in each other's production sector. For example, women are responsible for selecting and sowing seed, while men take charge of branding and docking animals. Again, these activities require special skills and technical knowledge. But more important, they give each gender an active "quality control" role in the other's sector of production. For example,

during seed selection, women take note of produce quality and quantity, and they have a say in the selection of crops and varieties to be planted the following season. Similarly, while branding and docking the household's sheep, men have an opportunity to review flock age and sex distributions and to gauge the animals' health and nutritional status. The experience gleaned from carrying out specific tasks in each other's sector gives women and men firsthand knowledge of crop and flock potentials, respectively. This furnishes them with criteria for meaningful participation in decisionmaking at the farm unit level. It also provides each a way to evaluate the production efforts of the other.

SUMMARY AND ANALYSIS

Three organizational strategies used by Andean communities to distribute risks in an adverse environment have been discussed. The implementation of these strategies is based on cooperative arrangements among and within different groups of people: community households, farm units, and genders. These groups and their associated organizational tasks can be classified into six types.

The first can be termed community-resource managers and consists of the communal assembly. It makes decisions on matters such as land distribution, use of communal pastures, and allocation of hydrologic and forestry resources. The second is the interhousehold labor exchange group, which cooperates across farm units to alleviate labor shortages in specific crop and livestock tasks.

Farm-unit managers comprise the third group. These consist of the adult members of the farm unit, usually a husband and wife. They jointly determine the unit's overall production objectives: what to plant during and across years and for what purposes (consumption, sale, social obligations); what species and breeds of animals to buy; which inputs to purchase or barter for in order to support the production effort. Although the father/elder male is usually the public spokesperson for this group, he is not the sole decisionmaker.

The fourth group is the production-sector managers. They are in charge of day-to-day farm operation. In the mixed production systems of high-altitude Andean communities, men supervise the crop sector while women administer the animal sector. Given this division of responsibility, sector managers have more knowledge and experience in certain specialized realms like soil quality, climatic conditions, and ox-team training (men), or animal health, reproduction, and range quality and capacity (women).

Quality controllers comprise the fifth type, in which specific adult members of the farm unit have precise technological knowledge in and longterm responsibility for certain subdomains of agricultural and pastoral production. For example, as noted earlier, women are in charge of seed selection and the sowing of tubers, maize, and broad beans (all of which are plants that are sown by placing the seed directly into the earth); but branding, docking, and training animals is men's work.

The sixth group, task implementors, is composed of all farm unit members who carry out tasks according to production needs, personal ability, and availability. For example, at any given point herding, weeding, and sowing may be performed by men, women, children, and elders depending upon individual physical capacity and technical skills. When all adult labor is otherwise occupied—as during harvesting, threshing, or branding—children or the elderly take over daily chores like herding, administering remedies and supplementary fodder to livestock, collecting fuel, and preparing meals for workparties. They may also help with lighter field tasks like removing the first tubers loosened at harvest.

It should be noted that this typology is a heuristic one. Throughout the world, in communities where women have longstanding ritual and productive ties to the soil, a relative equality between the sexes exists (Harman 1984:5). In the Andes, there are no overt taboos as to what gender or age may or must carry out which activities. As noted, tasks may be distributed according to immediate need and worker availability. And women (single mothers, widows, or those whose spouse is working elsewhere) often carry out specialized tasks in both the crop and livestock sectors. Furthermore, the composition and structure of households, farm units, and communities change as people migrate or as outside values are introduced. Nevertheless, this typology provides a tool for understanding the complex, organizational strategies that distribute agricultural production responsibilities among and between community households, farm units, and genders.

IMPLICATIONS FOR RESEARCH AND EXTENSION

In community-based agropastoralism in the Andes, crop, livestock, and resource management are carefully integrated. Likewise, the distribution of technical knowledge and skills, decisionmaking, and labor is organized in such a way as to guarantee efficient planning, production, and quality evaluation in both pastoralism and agriculture. Researchers and extensionists have long questioned why smallscale community-based farmers often fail to adopt "improved" agricultural technologies (Bilinsky and Gaylord this volume, Primov this volume). Many if not most of the technologies developed on experiment stations in Peru have not been incorporated into the farming systems of people who produce mainly for self-sufficiency. During the 1950s and 1960s, the common explanation for this was that the community-based farmer was too mired in tradition to accept new ways. She or he was thought to be content with the status quo, comfortable with a limited standard of living, and adverse to change. But traditionalism is not the main reason for the rejection of so-called improved technologies. It is increasingly evident that many of the alternatives designed on research stations require capital, labor, and ecological conditions that the small community-based farmer does not have. Technologies dependent upon external inputs may be beneficial in low-risk situations, but

they are often rejected by smallscale farmers in high-risk environments, where cash investments can all be lost in a single season.

To address the needs of community-based farmers, technologies must be designed and tested in situations that take into consideration the composite ecological, technological, and socio-organizational potential of smallscale production. In the latter regard, two questions are critical to research and extension oriented toward overcoming smallscale production constraints. First, *who* is making the decisions concerning resource allocation, production-unit objectives, and crop and livestock management? Second, *how* are production skills, responsibilities, and tasks organized across interhousehold groups and among men, women, children, and elders within the farm unit?

For example, in the Andean context described here, range and irrigation improvements should be proposed through the community assembly, since this group manages communal grazing grounds and water resources. It is the assembly who is responsible for husbanding existing resources and providing new and better ones for the community as a whole. However, suggestions to vary accepted fertilization levels, plowing methods, or certain veterinary procedures like dipping should be presented to the interhousehold workgroups, who share technological criteria that they implement jointly. It is unlikely that one member of an interhousehold workgroup would modify a production technique unless the whole group agreed to do so.

On the other hand, if recommended innovations might redirect the production objectives of the farm unit—e.g., a shift in the proportions of plant species cultivated or the introduction of improved breeds of sheep—then these must be discussed with the household adults, both men and women, who take part in such decisions. Illustrating further, introduction of selective breeding of livestock or of innovative seed storage methods should be presented to the appropriate sector managers—i.e., adult women in the case of Andean agropastoralists.

In sum, a straightforward, empirical understanding of who is making what decisions, at what levels of the production system, and which groups have responsibility for executing these decisions will allow researchers and extension agents to get the right information on practices and problems from and to the right people. Moreover, this understanding will direct testing of new ideas and possible alternatives to those most concerned and interested, those who are in a position to make decisions for change.

NOTES

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PART THREE

Agropastoral Systems: Change and Development

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Brief Communications

Veterinary Anthropology

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A new application of anthropology to problems little studied by the discipline heretofore, "veterinary anthropology" has arisen largely through the stimulus of international livestock development projects like the Small Ruminant Collaborative Research Support Program. The field consists of the investigation and application of folk veterinary knowledge, theory, and practice to increase livestock health and productivity. Here, general approaches and issues within veterinary anthropology are introduced. Then, drawing upon SR-CRSP researches in highland Peru between 1980 and the present, some of the topics and tasks addressed by this comparative and interdisciplinary endeavor are illustrated. Discussion demonstrates how emic and etic, anthropological and biological understandings of folk concepts and management of livestock disease can be practically and productively melded in development programs.

Key words: development, agricultural, and ecological anthropology; ethnomedicine; ethnosemantics; pastoralism; farming systems

"Veterinary anthropology," also known as ethnoveterinary research and development (McCorkle 1986), is a pioneering area of study which spans ethnomedicine and international agricultural development, drawing upon the skills of sociocultural (especially ecological and economic) anthropologists, linguists, and veterinary scientists (e.g., epidemiologists, immunologists, microbiologists, parasitologists, pathologists, pharmacologists, physiologists), plus specialists in still other disciplines like animal husbandry, range science, water management, agricultural economics, etc. As a named and recognized branch of research, veterinary anthropology is barely a decade old. It has arisen primarily from integrated interdisciplinary efforts on livestock development projects like the Small Ruminant Collaborative Research Support Program (SR-CRSP) (McCorkle 1982, 1983a) and the Niger Range and Livestock Project (Sollod and Knight 1983; Sollod et al. 1984). These projects meld social and biological sciences to focus upon immediate production problems of Third World stockowners.

Briefly defined, veterinary anthropology consists of the systematic investigation and practical application of folk veterinary knowledge, theory, and practice within a holistic but comparative and production-system-specific framework. In the latter context, it forms one component in mixed farming-systems research. Its goal is to increase livestock production and productivity through improved management of animal health, as informed by an interdisciplinary understanding of folk veterinary medicine and related husbandry techniques.

Such research is important because without improvements in animal health (and with it, nutrition), rarely can any other improvements in livestock production systems be achieved. And increased food and income from livestock products hold forth one of the greatest promises for increased human well-being throughout the developing world—where, for example, two-thirds of the globe's domesticated ruminants are found (WILRTC 1978:25) and where herd and/or barnyard animals typically are raised even by "the poorest of the poor."

Key elements of veterinary anthropology include the following.

1. An explicit recognition that the complexity of exogenous (i.e., factors external to etiological agents and their hosts) and endogenous variables impinging upon animal health lies beyond the ken of any one social or technical science.
2. An emphasis upon in-depth, firsthand field research among stockowners themselves under real-world husbandry conditions in order to achieve any meaningful, holistic understanding of the complex structures in which animals and their owners are embedded.
3. The use, therefore, of time-tested methods of anthropological fieldwork, combined with the laboratory expertise and technical skills of veterinarians and animal scientists.
4. Perhaps above all else, equal attention to emic and etic, folk and scientific, in the description and analysis of animal-health problems and solutions.
5. Finally, a firm commitment to making research results useful for hands-on livestock development and extension,

coupled with a constant awareness that the ultimate goal is increased *human* rather than *animal* well-being.

Topics typically addressed include: veterinary ethnosemantics and ethnotaxonomy; ethnoveterinary pharmacology, manipulative techniques, and magico-religious operations; and appropriate methods and personnel for veterinary extension. The overarching subject of veterinary anthropology is folk management of animal health in the context of the pastoral or farming system as a whole, and its relation to larger ecological, socioeconomic, cultural, political, historical, and other realities.

It is not possible to address all these issues here. (For full detail, see McCorkle 1986.) Instead, the aim is to illustrate some of the approaches and applications of this exciting new area of international agricultural research and development, drawing upon SR-CRSP activities in highland Peru between 1980 and the present.

Emic and Etic, Anthropological and Biological

One of the most basic tasks of veterinary anthropology is investigation of the folk knowledge systems and the associated semantic and taxonomic systems which guide and encode animal management practices. An appreciation of the shape, scope, and accuracy of a people's etiological, anatomical, physiological, diagnostic, therapeutic, and epidemiological information about livestock ills is essential. Without this, developers cannot even begin to evaluate what, how, and if native veterinary practices should be altered. Much less can they communicate their evaluations and relevant development strategies in a way that is comprehensible, culturally non-offensive, and congruent with indigenous cognitive and social systems pertaining to animal husbandry.

The first part of this task is to translate folk ways of conceptualizing, describing, and combatting animal ills into Western scientific terms.[1] Predictably, this is not easy. Medical science—whether human or animal—classes diseases and stipulates treatments and prophylaxes according to the etiological information afforded by sophisticated laboratory analysis. In contrast, at least pending practical necropsy, ethnoveterinary distinctions and therapies typically rely on the recognition of morbid signs, more rarely on epidemiological observation, sometimes on sorcery, or on any combination of these.

Below, a comparative analysis is presented for one major category of livestock disease recognized by Quechua Indians of highland Peru. Folk and scientific understandings are systematically compared along the following parameters: clinical signs and diagnosis, etiology, treatment, and prevention and control. (For parallel analyses of nine other disease designations, see McCorkle 1982 or 1983a.) These data derive from the author's fieldwork in 1980 in the peasant community of Usi, Department of Cuzco, Peru. Next, an example is given of the successful application of veterinary anthropology to another cateogry of livestock diseases. This example stems from on-going work in ethnopharmacology by SR-CRSP social scientists and veterinarians in the peasant community of Aramachay, Department of Junín, Peru. Finally, both specific and general implications of these two cases for livestock development programs in the Third World are outlined.

Q'ICHA IN USI.

Quechua stockowners in Peru invariably report *q'icha* as one of the most destructive diseases plaguing their herds of sheep, llama, alpaca, and cattle. The translation of *q'icha* is simply 'diarrhea.'

Clinical Signs and Diagnosis. This disease is not only named for, but also diagnosed by, its most obvious clinical sign. Usiños uniformly apply this diagnosis across all species to any case of diarrhea. At the same time, they remark a number of additional signs, many of which are merely the general indications of parasitism: weakness, fatigue, listlessness, loss of appetite, and in one informant's words, overall "stupefaction." Villagers also cite other indications which can accompany the diarrhea, e.g., fever; blood in the urine and feces; foaming at the mouth; blind staggers; and in sheep, yellowing and dropping of the wool. In fact, some of these symptoms are unrelated to the diarrheas. Many others which are implicated go unmentioned, e.g., bloating or swelling of various parts of the anatomy; differing consistencies and colorings of the feces; anemia, as evidenced by paleness of eye, nose, and mouth membranes; and more (cf. Ensminger 1970; Fulcrand Terrissee 1978).

Etiology. Scientifically, the jumble of symptoms which Usiños gloss as *q'icha* corresponds to at least seven distinct ailments spanning endoparasitic, bacterial, viral, and toxemic etiologies. Folk ideas as to the causes of *q'icha* are much more colorful, however. One of the most dramatic explanations is that malevolent foreigners have polluted community water supplies and grazing lands with diarrhea-inducing substances broadcast from airplanes!

Additionally, many villagers adduce a variety of supernatural causes for this and other livestock ills, e.g., the anger of a mountain spirit (*apu*) or of the *Pachamama* 'earth mother' at a stockowner's failure to pay these dieties proper respect and ceremony; a punishment from God for wrondoing; a neighbor's vindictive sorcery; and in certain cases, a herd's desire to follow its decreased master into death. Another frequently cited cause of diarrhea is a fascinating panoply of twisting, gusting, sacred, and evil 'winds' *wayra* (McCorkle 1982, 1983a). Curiously, from informants' recitation of clinical signs, sometimes these wind-induced ailments appear to gloss plant poisoning from native loco weeds (*Astragalus* spp.).

Supernatural diagnoses may be made singly or in combination with other, more naturalistic etiologies. An example of the latter is some stockowners' apt attribution of *q'icha* to internal parasites. However, this etiology is often cited only upon observation of massive worm infestation at slaughter. Folk theories as to how these worms enter livestock vary. One posits that animals ingest them during early-morning grazing when pastures are still moist with dew. The tiny worms or worm eggs are said to be encased in the dew droplets. Another theory holds that the dew-ridden grass itself infects the herds. Also, a few villagers link *q'icha* to the muddy, muck-filled corrals of the wet season. All stockowners agree that the disease is most troublesome at this time of

year. Others add that sometimes *q'icha* results from livestock's eating too much fresh, young grass.

Although Usiños are unable systematically to correlate these more naturalistic ethnoetiologies and their associated management practices with specific types of *q'icha,* comparison with findings in Western veterinary science indicates that they are essentially empirically correct for some diarrheal ills.

Of course, damp conditions generally favor the spread and growth of a number of diarrhea-inducing agents and/or their hosts—as with the stomach and gut worms of verminous gastroenteritis and various bacteria (cf. Ensminger 1970). For example, when sufficient moisture is present, the larvae of the common stomach worm crawl up grass blades, coming to rest with evaporation and moving onward and upward with additional moisture. Once they pass the one-inch mark, below which some 98 percent of most infective larvae are found, they are more likely to be consumed by livestock. (Along with erosion control and forage sustainability, this is one of the principal reasons for avoiding overgrazing.) Similarly, the hardy grass mites which host the larvae of other intestinal worms migrate upwards during the cool dimness of early dawn; but as the sun emerges and the day grows warmer, they retreat into the protective soil.

Wet pastures and heavy rains favor the snails that host the embryos and cercariae of the liver fluke, which promotes the constant diarrhea of hepatic distomatosis. Certainly, wet, filthy corrals provide the ideal environment for a variety of bacteria which produce diarrheas in both ovines (e.g., *Escherichia coli* and *Clostridia perfringens,* Ensminger 1970:457) and camelids (e.g., *Clostridia wilchi,* Flores Ochoa 1979). Likewise for the microscopic protozoa of coccidiosis, which cause the bloody diarrhea commonly known in English as "red dysentery"—although like many infectious agents, the coccidia oocysts are readily destroyed by direct sunlight and complete drying (Schillhorn van Veen 1986). Finally, diarrhea may sometimes accompany enterotoxemia or "overeating disease" (Alexander, pers. com.). This results from an anaerobic bacterium which proliferates and becomes toxic when animals are abruptly placed on rich, high-carbohydrate diets—like the fresh, young pasturage of the early rainy season.

Treatment. Treatments for *q'icha* differ as much as ethnoetiologies. When sacred or evil winds are diagnosed, cures vary according to the type of wind involved, and largely rely on magical techniques. For other supernatural causes, stockowners may perform appropriate propitiatory rites; or in the case of sorcery, they may hire the de-hexing services of a shaman. However, the most popular cure consists of drenching (the force-feeding of liquids) with any of a host of herbal infusions and decoctions mixed with other ingredients like lemon juice, human urine, salt, and oil. An adjunct therapy is to rub such preparations onto the sick animal's body, especially in the area of the liver. An alternative cure is to feed it handfuls of salt.

The practical value of some of these treatments is obviously debatable. In animals, supernatural cures do not afford even the psychosomatic benefits they can produce in humans—although they of course comfort the worried stockowner. And heavy salt feedings may only worsen certain conditions. However, Usiños express considerable satisfaction with their herbal remedies, avowing that these often work. If nothing else, force-feeding liquids may combat diarrheal dehydration. It is also possible that the herbs employed have anthelmintic (de-worming) and constipative properties.[2] Finally, as Elisabetsky (1986) notes for human ethnomedicine, recent scientific findings on skin permeability are at least suggestive for additional research on topical applications of folk veterinary medicaments.

Usiños know that commercial drugs to combat *q'icha* and other livestock ills are readily available in nearby towns. However, they hardly ever purchase such preparations, for good reasons. For one thing, modern veterinary medicines are usually too expensive for the peasant pocketbook. Relatedly, people complain about the travel expenses and time involved in obtaining and applying commercial drugs. And particularly for sheep, the drugs are not cost-effective; better simply to slaughter the animals. Moreover, informants report that on the few occasions when they did attempt storebought cures (usually for the much more valuable and beloved camelids), their money was thoroughly wasted. They say the medicines worked only for a week or two, or not at all; that they cured some animals but not others; or even that they hastened the creatures' deaths.

In part, such failures are due to Usiños' imperfect understanding of which drugs to purchase. Villagers may also be ignorant of alien medicaments' proper posology. Applied too sparingly or irregularly, no drug is effective. Conversely, excessive and/or too-frequent doses of powerful modern drugs can further sicken, and even kill, the scrawny, malnourished animals which comprise many Indians' herds. Ethnic domination mechanisms also figure in commercial treatments' failure. Mestizo storeowners habitually foist off their oldest, shoddiest, or most slow-moving merchandise on Indian clients. In consequence, the few pharmaceuticals villagers do purchase are sometimes long past their effective shelf-life, or even contraindicated.

Prevention and Control. Prophylaxes logically follow from etiologies. In the supernatural realm, for example, prevention consists of keeping animals away from windy areas, avoiding quarrels with co-villagers and wrongdoing, and performing ceremonies properly—particularly the annual reproductive and protective rites, *t'inka,* for herd animals. The latter are colorful, festive affairs featuring dramatic events like the forced inebriation of camelids; "marriages" of herd-animal couples (both ovine and camelid); burnt offerings to the earth mother; libations cast to the *wayra* 'winds'; propitiation of powerful mountain, aquatic, and lightning spirits; and more. (For additional details, see e.g., Allpanchis Phuturinga 1971, Aranguren Paz 1975; Flores Ochoa 1977; Mayorga et al. 1976; McCorkle 1983a, 1983b; Nachtigall 1975; Tschopik 1951; Valderrama and Escalante 1976.)

In the natural realm, given "drew-ridden grass" etiologies of *q'icha,* Usiños do not graze stock in the early morning, before the dew has dried. Dirty-corral explanations lead some people to rotate corrals during the rainy season. But only one villager reported any systematic effort to clean and disinfect corrals.

Now, while there is some merit in keeping animals away from windy areas (e.g., to minimize cold stress and perhaps

certain aerially transmitted ailments[3]), this has little direct impact on the risk of acquiring a diarrheal disease. Neither do pastoral rituals—though they may serve various "library" and instructional functions, encoding and transmitting valuable pastoral information in their symbology, incantations, and ritual paraphernalia and enactments (Flores Ochoa 1977). On the other hand, avoidance of damp, filthy surroundings generally *is* an apt preventive measure for a number of parasitic and other ills which induce diarrhea in Usi's livestock. But aside from the few measures just listed (both supernatural and natural), Usiños do little to prevent or control *q'icha* and the many other diseases afflicting their herds.

Indeed, village stockowners follow almost none of the tenets of preventive medicine set forth by veterinary science, e.g., prompt isolation or slaughter of animals with transmissible diseases; general sanitation in all management operations—like docking, shearing, castrating, ear-branding, birthing; periodic cleaning and disinfecting of animal quarters, and provision of clean, dry bedding; regular mineral feeding; dipping, dosing, spraying, dusting, vaccinating against both parasitic and nonparasitic ills; eradication of toxic flora; subdividing herds by different age/sex/species susceptibility to contagion; avoiding overgrazing and regularly rotating pastures. Expectedly, Usiños' inaction in many of these regards is linked to constraints on capital, labor, and land. In others, however, lacuna in folk veterinary knowledge are implicated—particularly in etiological and epidemiological information.

In sum, comparative analyses such as that of *q'icha* in Usi provide important insights into ethnoveterinary systems. Specifically, they help pinpoint within the indigenous knowledge and management systems *where* animal health could potentially be improved. Veterinary anthropology also suggests *how* improvements can be brought about—as the next example illustrates.

Utashayli in Aramachay. In the central sierra of Peru, the community of Aramachay identified ovine ectoparasitism as one of their primary herd health concerns. Like Usiños, Aramachay stockowners are well aware of the existence of modern veterinary pharmaceuticals to combat this problem. Indeed, until the late 1970s villagers regularly employed commercial sheep dips and other modern methods of ectoparasitic control. But with Peru's rampant inflation and crumbling economy, by the 1980s these remedies had become too expensive for all but a few families (after Fernández 1986).

Community members met with SR-CRSP personnel to discuss this problem. During the meeting, a village shepherd recalled a traditional home-remedy for ectoparasites of horses, burros, and cattle. An all-but-forgotten therapy, it consisted of rubbing a preparation made from the leaf of a local wild tobacco, named *utashayli,* into the afflicted animals' hide. Villagers wondered whether this topical treatment could be modified to serve as a dip for sheep. With the assistance of SR-CRSP social scientists and veterinarians, they organized a series of trials to test this idea. As per the longstanding use of nicotine-based parasiticides in both folk and modern veterinary medicine worldwide, the trials were successful. Indeed, stock-owners felt the *utashayli* dip was even more effective than the commercial preparations they had previously used (*op. cit.*).

SR-CRSP veterinarians are now conducting laboratory research to establish the minimum effective frequency and concentration of the dip (Bazalar and Arévalo 1985). Meanwhile SR-CRSP social scientists are investigating how to organize the cultivation and/or controlled harvesting of this wild plant to ensure an adequate and equitable supply. At the same time they are helping the community to establish social, economic, and juridical mechanisms for preparing the medicament, financing and maintaining dipping structures, and universally enforcing the treatment.

Additionally, the project is testing the tobacco compound in combination with *tarwi* water. *Tarwi* (*Lupinus mutabilis*) is a bitter, alkaloid-laden legume which is edible only after prolonged steeping. The resulting infusion has long been used in the southern sierra as an effective folk remedy for ectoparasites of alpaca (Bustinza 1985). Project veterinarians in both southern and central Peru are analyzing still other plant materials in the ethnopharmacopoeia (artichoke leaves, squash seeds, various herbs) which are employed to combat ovine endoparasitism (Arévalo and Bazalar 1986; Zenon Choquehuanca, pers. com.). Eliciting or recovering this indigenous knowledge is one of the tasks of SR-CRSP anthropologists—as is holistic research into ethnoveterinary systems, and collaboration with community members to disseminate new veterinary information and develop improved husbandry practices which fit comfortably into existing ideological, socioeconomic, and production systems.

Discussion

In accord with findings in veterinary anthropology from other parts of the globe (Schwabe and Kuojok 1981; Sollod et al. 1984; Wolfgang 1983; Wolfgang and Sollod 1986), the case of *q'icha* in Usi suggests that Third World stockowners such as those discussed here could improve livestock health and productivity solely by incorporating additional veterinary information into the indigenous knowledge system.

For example, Usiños' premorten ethnodiagnoses of *q'icha* are often confused. Generally, villagers fail to recognize prodromes and syndromes which would permit them to distinguish one diarrheal ailment from another, and to treat and prevent it accordingly. There is an important caveat here, however. For some livestock ills, Quechua diagnostic and therapeutic skills rival those of Western veterinary medicine. Predictably, these are diseases which have patent manifestations, like ectoparasitism or contagious keratoconjunctivitis ("pink eye"). In the latter, for example, Usiños reportedly achieve 100 percent cure rates, even though ethnodiagnosis and therapy are partly cast in supernatural terms.

Nevertheless, for *q'icha* and many other diseases, these Andean stockowners could certainly benefit from increased diagnostic information—if only, e.g., to distinguish endoparasitism from plant poisoning. Indeed, better understanding of the developmental symptomology of *any* ailment allows for earlier and more positive diagnosis. Simple and inexpensive education into the prodromes and syndromes of the economically most destructive diseases plaguing their herds permits stockowners everywhere to take more prompt

and appropriate management action—whether quarantine, treatment, or immediate slaughter.

In the same vein, Usiños' ethnoetiologies are significantly incomplete. Villagers themselves confess they often have no idea of the causes of their animals' ailments. Lacking modern laboratory tools, techniques, and access to the in-depth veterinary information these provide, like many Third World stockowners Usiños are understandably ignorant of the microscopic life cycles of certain endoparasites, often along with the existence of hosts and vectoring agents, and even simple excremental cycles. For example, villagers in both Usi and Aramachay were unaware of the role of the intermediate snail host with which their pastures are visibly infested and which leads to the constant diarrhea of hepatic distomatosis.

While they are not the whole problem, such gaps in folk veterinary knowledge in part explain Usiños' inaction in prevention and control. Without insulting existing etiologies—both supernatural and natural—development personnel can readily explain that there are still other sources of disease which must also be warded against.[4] (Except, perhaps, when expatriate developers are confronted with "malevolent foreigner" ethnoetiologies . . . .)

Admittedly, Third World stockowners typically lack the capital, labor, or technology to devote to intensive systems of animal husbandry (McCorkle 1983b; Vincze 1980). They may therefore be unable systematically to destroy the agents, hosts, and vectors of disease. However, with increased etiological and epidemiological information, stockowners can often take advantage of at least some basic, low- or no-cost controls like: not herding where agents, hosts, and vectors of disease abound or where, at certain times of the day or year, they are most active; relatedly, instituting or reinforcing household- or community-level pasture rotation systems; not constantly quartering animals in their own excrement; exercising simple hygienic habits in management operations; recognizing and thus avoiding contaminated water; creating herd subdivisions; and so forth.

For both prevention/control and treatment, the case of *utashayli* in Aramachay illustrates the very real benefits of teaming folk and scientific, social and biological know-how to tackle specific development goals. There, SR-CRSP efforts in ethnopharmacotherapy emphasize compounds and applications which are based upon cheap or even free materials available locally, and which are readily comprehended and easily prepared within the community. Equal attention is given to community social systems for managing veterinary health programs. This integrated approach obviates the negative reciprocity and human indignities of dealings with oppressive, superordinate ethnic groups; and it frees stockowners from dependency upon expensive external inputs over whose quality, price, and supply they have no control.

Indeed, spasmodic breakdowns in the supply of alien technology to local populations in the Third World are commonplace. Breakdowns may be due to civil strife, simple infrastructural inadequacies, political and financial machinations within the government livestock service, or an unstable economy. As Lawrence et al. (1980) have dramatically documented for another part of the globe, asystematic extension of Western veterinary technology can ultimately result in more acute animal health problems than if it had not been adopted in the first place. The well-being of human groups who depend upon livestock for a crucial part of their subsistence is accordingly imperiled.

Veterinary Anthropology and Development

In the findings and hypotheses of veterinary anthropology to date, some consensus on development and extension strategies is emerging. To wit, that educational, managerial, marketing, and other such interventions are often more appropriate, economical, and effective than modern drug therapy, e.g., as applied in mass vaccination and treatment schemes, or other costly top-down, "tech-fix" programs like wholesale eradication of disease-bearing pests. Not surprisingly, findings also indicate that interventions grounded in indigenous practice and/or evaluated and coordinated by local stockowners or native veterinary practitioners are likely to be more successful.

Along with stockowners everywhere (McCorkle 1986), the Andean groups described here control considerable empirical veterinary knowledge. At the same time, as nearly all researchers of ethnoveterinary epistemology have observed, many folk diagnoses, explanations, and curative or preventive steps are "incorrect in major or minor parts" (Schwabe and Kuojok 1981:237). Veterinary anthropology is just one new example of an overarching approach to development which melds non-Western and Western, anthropological and biological science in order to understand and successfully build upon indigenous knowledge systems in designing and implementing sensitive, bottom-up interventions (cf. Brokensha et al. 1980; Dommen 1988; Richards 1985). Moreover, in this process the bearers of such knowledge ideally take an active role as co-researchers and developers.

This approach provides two critical kinds of development intelligence. First, as for *q'icha* in Usi, it can identify where the indigenous knowledge system could most benefit from increased information. Second, as with *utashayli* in Aramachay, it taps this same system and its human bearers to generate solutions which are culturally acceptable, technically comprehensible, ecologically sound, and socio-structurally, economically, and even politically feasible—i.e., "appropriate" in every sense. To achieve these solutions, conventional folk/scientific, social/biological, and active/passive boundaries must be transcended.

NOTES

[1] This comparative or "translation" exercise should not be taken to imply any ethnocentrism. The issue is *not* how closely folk knowledge and practice parallel Western veterinary medicine, or whether indigenous beliefs and practices are "right" or "wrong" in any absolute sense. Rather, it is the extent to which they promote productive animal management given the resources (ecological, technological, socio-organizational, informational, etc.) actually or potentially and realistically available to stockowners. For further discussion of this point, see McCorkle 1983a and 1986, and more broadly, Brokensha et al. 1980. Also, although she addresses human rather than

veterinary ethnomedicine, Elizabetsky 1986 expresses in an especially insightful and sensitive manner many of the points at issue here. In particular, she emphasizes how ethnological evaluation coupled with biomedical research can return indigenous knowledge "improved through scientific analysis, to the people that most contributed to it and most desperately need it" (1986:125). In the process, knowledge that would otherwise be lost is rescued, and low-cost medicines can be developed which are free of the sales, delivery, distribution, consumption, and misinformation problems attaching to modern commercial pharmaceuticals in the Third World.

[2] Interestingly, these same concoctions are used for human diarrhea. Unfortunately, at the time of fieldwork in 1980, the SR-CRSP did not yet have the facilities and personnel to analyze the plants in question.

[3] There is some controversy in the veterinary literature over the role of aerosol transmission—the classic route for respiratory ailments—in diarrheal diseases. While certain diarrhea-inducing viruses and bacteria can be spread in this fashion, most researchers feel it is more closely related to direct contact—e.g., in crowded and poorly ventilated quarters—than to airborne routes (Donald Blenden, pers. com.). In fact, the strong winds on open ranges that Quechua stockowners are referring to when they speak of *wayra* would likely offer some protection from contagion by diluting rather than enhancing aerosol transmission of diarrheal agents.

[4] See Fernández 1986 for an instructive example of action anthropology to disseminate veterinary information in highland Peru. Significantly, the case she independently encountered also involved ignorance of the life cycle of the liver fluke and its snail host.

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Alaska Native Regional Strategies

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In 1971, the U.S. Congress passed the Alaska Native Claims Settlement Act (ANCSA) in order to resolve a long standing dispute over land ownership in Alaska. ANCSA, a very complex piece of legislation, has had a considerable impact on Alaska Natives. Among other things, ANCSA imposed a corporate framework on Alaska Natives consisting of twelve in-state regional for-profit corporations; one non-resident regional Native for-profit corporation; twelve regional non-profit social service corporations; and over two hundred village corporations.

This article examines the issue of regional development as a function of strategies formulated either explicitly or implicitly. Our study focuses on prominent characteristics of various Alaska Native regional groups to determine which have been able to formulate and implement an effective development strategy capable of dealing with the social, economic, and educational needs of their communities. The selected characteristics of these regions include: size and the distribution of regional populations; ethnic homogeneity; sources of income and employment; and numerical political strength.

Although not quantitatively rigorous this empirically oriented analysis does identify some of the obstacles to achieving coordinated regional development by Native people living in remote Northern regions. In discussing these findings, we also consider the impact of the corporate organizational form as it has been introduced and adapted in rural Alaska.

Key words: Alaska natives, regional development, strategy, ANCSA corporations

Throughout human history a variety of intermediate institutions from families or kinship units to local governments have assumed the burden of coordinating actions for the general welfare of their membership. In the modern industrial or post-industrial world, these institutions continue to carry out this responsibility usually within the broader confines of nation-states. In Alaska, the creation of regional profit-making corporations by the Alaska Native Claims Settlement Act of 1971 (ANCSA), and the establishment of parallel non-profit corporations have augmented traditional approaches.[1] While these regional organizations have assumed some of the functions that once were provided by the Bureau of Indian Affairs, or by the villagers themselves, they are perceived by many Native Alaskans as yet another foreign western institution that has been imposed upon them (Davis 1979; Dryzek and Young 1981; Marshall 1984).

This article explores the new regional orientation in Alaska Native society brought about by ANCSA and subsequent legislation (e.g., the Alaska National Interest Lands Conservation Act). Specifically, our intent is to examine the degree to which Alaska Native regions exhibit coordinated economic and social policies and actions designed to promote the general welfare of the regional population. We distinguish between explicit and implicit regional strategies, and analyze salient characteristics of the twelve Alaska Native regions to determine why regional strategies are more easily established among some regional populations than others. The regional characteristics we examine are: the size of distribution of the regional Native populations; their homogeneity, sources of employment and wages; and the relative numerical dominance of Alaska Natives in their respective regions.

Since the regional profit-making corporations created by ANCSA are typically among the most powerful regional institutions, we consider the issue of their responsibility for the formulation of coordinated regional development strategies. (See Map of ANCSA Corporate Regions.) Because of the strikingly different conceptions of the corporations between a profit-maximizer and a social service agency, adaptations to local situations have often been frustrated. In closing, we discuss the problem as it is reflected in Alaska Native regions and consider another organization approach, and its potential applicability to Native Alaskans.

Alaska's indigenous peoples exhibit substantial diversity in a variety of dimensions including language, economic basis, social organization and culture. In addition, Alaska Natives have experienced different historical relationships with EuroAmericans—making each unique, while in other ways creating a degree of convergence. One commonality which is shared, down to the present, is the autonomy of and the responsibility of local groups for the welfare of their members (Conn and Hippler 1975; Shinkwin 1984). The vehicles for accomplishing the cooperative efforts at the local level were primarily kinship based. Alaska Natives were (and to a substantial degree still are) encultured to be solicitous of kinsmen

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1

AGROPASTORAL SYSTEMS RESEARCH IN THE SR-CRSP SOCIOLOGY PROJECT[1]

Constance M. McCorkle

Agropastoralism can be broadly defined as any system of mixed crop and livestock production in which herd animals derive a portion of their diet—whether directly (by grazing) or indirectly (from cut-and-carry forages)—from plant crops, crop residues or byproducts, or fallowing fields. The agronomic and, to a lesser extent, the animal-science aspects of such production systems have received a respectable amount of conventional research attention, albeit often independent of one another (see below). But the same cannot be said for the complex social, cultural, and political-economic dynamics of agropastoralism. The goal of the present volume is thus to elucidate the "people" part of such plant/animal production systems. To do so, the book draws upon more than a decade of research on agropastoralism worldwide conducted by the Sociology Project of the Small Ruminant Collaborative Research Support Program (SR-CRSP).

The SR-CRSP is the oldest of eight such CRSPs (pronounced "crisps"). They constitute innovative, interdisciplinary agricultural[2] research and development (R&D) programs established under the U.S. International Development and Food Assistance Act and its Title XII amendment, the Famine Prevention and Freedom from Hunger Act. The CRSP mandate is, through cooperative training and research, to strengthen the ability of both U.S. and host country institutions to apply agricultural science to solving world food and nutrition problems. CRSPs focus on enhancing the production, distribution, storage, marketing, and consumption of key food commodities among smallholders and the poor in developing nations. This is done through design of appropriate crop and livestock technologies, management practices, and alternative processing, marketing, and related strategies.

The first foodcrop selected for CRSP research was domesticated small ruminants, i.e., sheep, goats, and the American camelids (alpaca and llama). One or more of these species is raised in all developing countries, where they play a vital role in both national and local-level diets and economies. Moreover, these species are primarily managed by smallholders. Hence the establishment in 1978 of the SR-CRSP, in cooperation with five host countries (Brazil, Indonesia, Kenya, Morocco, and Peru) that together are home to a majority of the small-ruminant husbandry systems found among limited-resource producers globally.

The program itself is composed of nine closely linked disciplinary projects: animal management/production systems, range management, nutrition/forages, reproduction, breeding/genetics, animal health, systems analysis, economics, and sociology/anthropology. Of the eight CRSPs in existence at this time, the SR-CRSP is the only one to formally incorporate sociological and anthropological inquiry in a unit of equal standing with the biological/technical disciplines.[3] This component—the Sociology Project—has played a major role in advancing both scientists' and international developers' understanding of the dynamics of agropastoral systems.

PLANTS, ANIMALS, AND PEOPLE

Very few "pure" cultivators or "pure" pastoralists are to be found in the developing world. The overwhelming majority of rural peoples "impurely" raise both plants and animals. Yet within such mixed production systems, the agricultural sciences—social and biological alike—have traditionally treated cultivation and stockraising in virtual isolation and/or ignorance of one another. Given the heavily crop-oriented history of agricultural R&D, this has generally meant that relatively little scientific heed is paid the pastoral half of mixed farming. Many factors have likely conspired to bring about such blinkered or skewed views of agropastoralism.

Perhaps the major culprit is simple scientific reductionism—the common and often necessary heuristic of delimiting the reach of one's research so as to facilitate investigations and arrive at more elegant conclusions. Reductionism occurs both intradisciplinarily and disciplinarily. As an example of the former, animal scientists tend to concentrate on a single species or commodity (e.g., cattle, milk) even though it may be managed and marketed alongside a variety of other animals and animal products (e.g., sheep, goats, alpaca; manure, meat, and fiber) within the same farming system. Similarly, agronomists often specialize in a single crop.

To take a more pernicious example of intradisciplinary reductionism, social analysts of primary production systems have been prone to set up false dichotomies between pastoral herders and "peasant" cultivators, ignoring cropping among the former and stockraising among the latter. A classic case is the

ethnographically famous Nuer "cattle culture" of the Sudan. The Nuer have conventionally been portrayed as "pure" pastoralists. Yet without their "gardening" of staple cereals and pulses, they could not survive the year (Evans-Pritchard 1969:75 ff.). Conversely, social scientists have traditionally and even vehemently defined the native peoples of the Andes as almost solely dependent upon cropping, despite the fact that virtually all also keep animals (McCorkle 1990). Moreover, in these sierran farming systems, "Of all labor inputs, none is more lucrative" than stockraising (Brush 1977:116). Indeed, animals provide one of the first lines of defense in smallholders' fight for subsistence (see below).

Taken together, agronomy, animal science, and sociology/anthropology—with their avowedly distinct interest in plants, animals, and people—exemplify disciplinary reductionism. Ultimately, of course, these broad differences in scientific focus are what define a discipline. Such boundaries are drawn because they are necessary for the practical conduct of research and the derivation of nomothetic principles. However, it is easy to forget that they are in fact artificial constructs, created for a delimited scientific purpose and a highly abstract level of analysis. At the farm level, disciplinary boundaries blur back into a complex, commingled reality wherein plants and animals are intimately intertwined parts of a systemic whole that forms the foundation of an agropastoral people's very existence. Reductionism at this level is indefensible—both because this is where applied research and development action take place, and because it is precisely the panoply of tradeoffs and payoffs among different subsystems of production (cropping, herding, or others such as off-farm employment) that ensures the survival of smallholder farmer-stockraisers. Piecemeal study of these production subsystems and application of the therefore fragmented findings can have disastrous development consequences. For this reason, an interdisciplinary approach is imperative when it comes to devising and introducing successful interventions in an agropastoral system.

Beyond reductionism, still other factors have worked to disengage cropping and herding in past research in mixed farming systems and to distract attention from the pastoral part of such systems. Some of these factors involve insidious ethnocentrisms. With few exceptions (e.g., hogs + corn), contemporary commercial agriculture in the Western world, and particularly in North America, is characterized by specialized operations that raise crops *or* livestock but not both. Thus, when agricultural scientists from the First World look at mixed production systems in the Third World, their reductionistic tendencies are exacerbated by own-culture assumptions that only one subsector of production is the predominant or economically significant one.

Usually the livestock subsector is assumed to be subordinate. In part, this is because to Western eyes, the flocks and herds of limited-resource producers in developing countries may appear so small as to be negligible—often little more than half a dozen scrawny, sickly-looking creatures. No matter that—as many of the authors in this volume emphasize—these animals constitute a multipur-

pose commodity whose value to household economies and rural societies is not captured in mere head counts. Western stockraising operations normally emphasize only one animal product—meat, milk, or fiber. But for Third World smallholders, even a single animal is typically valued for a galaxy of goods and services. Depending upon the species and the culture, for herd animals these may include any combination of not only meat, milk and milk products, or fiber, but also: manure for fertilizer, fuel, or construction; blood, leather, hides, and minor products like bone, horn, sinew, gut, and hair; traction, transport, and clearing services; investment and fiduciary roles for which no other capital-storage alternative is available locally; of course, medicinal, ritual, and social functions, e.g., in natural or supernatural curing, in sacrifices, feasts, and rites of passage like marriage, and in recreational activities involving racing, riding, or fighting animals; and finally, herd animals' ability to move to and exploit numerous ecological niches. (See Table 1.1.)

Western-trained scientists are often unaware of these many diverse roles and values of even tiny herds. Whether because livestock in the Western world do not fill such functions or whether because some of the values placed on animals' varying goods and services in the developing world are not always readily quantifiable in market-oriented, money-economy terms, researchers can easily overlook the importance of livestock in smallholder mixed farming. They are even more likely to overlook small ruminants, thanks to still further ethnocentrisms. For one, much of the Western world holds a strong "cattle bias" that can render smallstock of all sorts nearly invisible. Again, this is especially true for North America, where cattle are the culturally preferred source of milk and red meat. In contrast, in other cultures, these same goods may be supplied by different species—e.g., goats or by a combination of large and small ruminants.

Another and often related ethnocentrism that has obscured the importance—indeed, sometimes even the existence—of small ruminants is the longstanding patriarchal prejudice of Western society. This often-unconscious bias can cause researchers to see only the agricultural work of adult males as important.[4] In consequence, in societies where women and children take charge of smallstock while men attend to cattle raising and cropping, only the latter activities may receive serious or thorough-going scientific attention. Along with other factors, this prejudice seems to have been at work, for example, in the mistaken generalization that rural Andeans are essentially cultivators. In the Andes, women and children typically see to herding while men primarily devote themselves to cropping.[5]

In an effort to avoid many of the dangerous reductionisms and ethnocentrisms enumerated above, recent farming systems research (FSR) paradigms of on-farm R&D have taken a more comprehensive approach to the study of mixed production systems that ". . . looks at the interactions [both social and biological] taking place within the whole farm setting" (Shaner et al. 1981:14). In actual practice, however, most FSR to date has vouchsafed only a rhetorical nod to the

subsector of production not under direct scrutiny in a mixed system. Given the agricultural sciences' historical emphasis on cropping research, plus added difficulties in on-farm experimentation with animals (Amir and Knipscheer 1989, McCorkle ed. 1990), this has meant that even FSR has been disappointing in terms of advancing our understanding of agropastoralism.[6]

In sum, although scientists have painstakingly described and analyzed the agrarian activities of many of the world's rural peoples, for a variety of reasons they have been slow to investigate the pastoral aspects—biological and especially sociological—of these same societies. They have been even slower to integrate results from such investigations into theoretical models of agricultural change and development and then to translate them into practical development action.

The present volume offers a corrective to this imbalance. It is no accident that the authors of this book collectively represent multiple disciplines (sociology, rural sociology, anthropology, ecology, range management, animal husbandry), several nationalities (Israeli, Kenyan, Moroccan, Peruvian, and U.S.), and both sexes. SR-CRSP research has been distinguished by its aggressively collaborative nature. The program aspires not only to the non-reductionist goal of interdisciplinary integration but also to even further forms of collaboration: among scientists of different cultures, so as to better forestall ethnocentric research assumptions; between scientists and producers—with the latter viewed as co-researchers and co-developers who will also be the end-users of new technologies and management practices—so as to better grapple with the gap between abstract and applied levels of R&D; and finally, between and among scientists and producers of different gender, age, and other statuses, so as to better ensure the equitable distribution of R&D outcomes among all these potential beneficiary groups.

APPROACHES TO AGROPASTORAL SYSTEMS RESEARCH

Just giving added weight and attention to the pastoral aspects of mixed farming systems is not enough to rectify the oversights and imbalances described above. Not only must research on agropastoralism be two-pronged, tackling plant and animal domesticates alike. It must also target the dynamic interface where the two subsectors meet within the larger production system—what I will term the agropastoral nexus. Insofar as past research has attended to this nexus, it has typically addressed only the positive dynamics between cropping and stockraising, highlighting numerous now-familiar complementarities. These take many forms: ecological, technological, economic, and socio-organizational. Drawing upon findings from Sociology Project research, Table 1.1 summarizes the most directly positive interactions at this agropastoral nexus. (For useful overviews, see, e.g., Bayer and Waters-Bayer 1989, McDowell 1980, and Vincze 1980.) However, Table 1.1. also lists a number of strains, tradeoffs, and tensions in people's simultaneous pursuit of plant and animal agriculture. As the table

TABLE 1.1 COMPLEMENTARITIES AND CONFLICTS IN AGROPASTORALISM[a]

■ HERDING AND CROPPING CAN COMPLEMENT EACH OTHER VIA:

Keeping fields under constant production by rotating their use between crops and livestock [2, 5, 7]

Diversifying the subsistence base, thereby in turn reducing overall farming risk [2, 3, 4, 5, 7]

Varying and enriching the farm family's diet [3, 10]

Decreasing cash outlays for both plant and animal foodstuffs [10]

Increasing income sources [virtually all chapters]

Relatedly, each subsector's generating capital that can be used to support the normal operation of the other [2]

Employing production-unit and community labor more fully and/or productively [2, 5-7, 10]

Allocating labor in a more energetically parsimonious [5] and/or more efficiently specialized [6] manner

■ HERDING CAN COMPLEMENT CROPPING VIA:

Providing draught power and transport for crops and crop inputs [5, 6, 8]

Furnishing fertilizer in the form of manure and urine, and generally promoting nutrient pooling (e.g. through composting with manure, livestock bedding, etc.) [2, 5, 8, 10, 11]

Exploiting nonarable lands, other biomes, or seasonal shifts that could not otherwise be made productive for human use [2, 4, 5]

Grazing animals' manuring and re-seeding/trampling, which promotes vegetative cover to forestall erosion on fallow fields [5]

Grazing animals on fallow land to help clear it for renewed cultivation [2, 5]

Cultivating forages on fallow lands so as to combat wind and water erosion

In the case of cultivated nitrogen-fixing forages, improving soil fertility [7]

In years of crop failure, recovering some of the value of cropping inputs by grazing the failed fields

Through stock sales, generating cash for the costs of re-initiating cultivation after a crop failure [2, 4, 6]

Also, providing substitute animal foodstuffs for humans during crop failures [2, 3, 4, 6]

Storing surplus capital earned from cropping in a highly fungible form that also yields "interest" in the form of herd growth both through reproduction and gains in body weight [2, 3, 8]

Providing seasonal credit for crop inputs, whether through sales of livestock and their products or through animals' serving as collateral [2, 6]

TABLE 1.1 COMPLEMENTARITIES AND CONFLICTS IN AGROPASTORALISM[a] *continued*

■ CROPPING CAN COMPLEMENT HERDING VIA:

Furnishing stored plant foods for humans during periods of pastoral problems [2, 4, 6]

Improving and stabilizing livestock diets with crop byproducts, stubble and high-quality supplemental feeds [2-8, 10]

Beyond just supplementation, providing stored feedstuffs that may spell the difference between herd survival or extinction during periods of forage scarcity [4]

Using fallow fields to raise cultivated forages so as to assure adequate livestock nutrition during seasonal shortfalls in other feed sources [7]

Turning any last residual effects of crop fertilizers to good use by, e.g.:
- grazing animals on the weed growth of fallowing fields
- planting fallow lands with forages [7]

Through sales of crops, generating cash to meet emergency needs for livestock inputs (e.g. veterinary supplies to combat an epidemic)

■ HERDING AND CROPPING CAN CONFLICT VIA:

Competing for access to scarce arable land for production of feed crops for animals as versus food crops for humans [3, 7, 10]

Competing for limited nutrients — e. g., using crop residues and stubbles for animal feed instead of plowing them back into the earth to "feed" fields

Competing for scarce capital and thereby prejudicing the sustainability or productivity of one subsector or the other, e.g. by:
- endangering the critical reproductive composition of herds because of pressures to "cash in" livestock so as to support cropping [2]
- conversely, blocking planned capital outlays for cropping due to extra costs (e.g. for health care, herding services, emergency feed) or risks (e.g. losses from rustling, disease) entailed by herding [2]

Competing for limited amounts or skill-levels of labor generally, and especially during "crunches" in the agropastoral production cycle when both crops and livestock require special attention [2, 5, 8-11]

Relatedly, spatially dispersing labor (for herding) when it most needs to congregate (for cropping), or vice versa [2, 5]

Essentially doubling the demands on the production unit for specialized technical knowledge [5, 6, 9]

Triggering disputes among socioeconomic units over, e.g.:
- animals' destruction of crops
- individual and group rights to manure, animals, or land and water for cropping versus grazing
- timely access to use of shared draught animals for field preparation [5, 7, 9, 11]

[a]Extracted and summarized from the chapters (bracketed numbers) in this volume plus other research documents and publications of the SR-CRSP Sociology Project.

indicates, many of these conflicts are simply the inverse of the complementarities inherent in agropastoralism.

To illustrate, cultivation and stockraising may complement each other by more fully employing household labor and more efficiently allocating tasks, skills, and technological knowledge across diverse biosocial groups (e.g., juvenile, adolescent, adult, and elder females and males). But during certain seasons or circumstances, conflicts may arise between the two subsectors over shortages of household labor of the appropriate age and skill-level needed to attend to equally pressing crop and livestock chores (see especially Chapters 2, 5, and 6). To take another example, animals provide "feed" for fields in the form of manure; in like vein, crops generate residues and byproducts that can be used to feed livestock. But these plant materials can also be plowed back into the earth to nourish future crops. Here again, the two subsectors are in direct competition over a limited resource.

Until little more than a decade ago, these sorts of potentially disintegrative strains between cropping and herding were largely ignored in the literature on agricultural R&D—even though, as Perevolotsky (Chapter 2) points out, the ancient story of Cain and Abel forewarns of stresses between the two pursuits. At least for the social sciences, inattention to the negative dynamics at the agropastoral nexus can be attributed in part to inadequate theoretical approaches.

One such approach is neofunctionalism, which in its application to the study of agropastoralism is too ready to assume an overly simple, closed system in homeostatic equilibrium. This assumption of a "harmonious whole" makes analysis insensitive to the kinds of intrasystemic tensions described above and outlined in Table 1.1. Likewise for the application of narrow ecological models, which focus primarily on the relationships between the production system and biotic and climatic variables. While valuable, such models fail to capture both fine- and coarse-grained, intra- and extra-systemic abiotic variables that may drive people's production decisioning and their valuation of tradeoffs between subsectors (Orlove 1980, Perevolotsky this volume).

For example, neither a functionalist approach nor a narrow ecological model can explain why some (but not other) Andean agropastoralists consciously and heavily overgraze the fallowing fields nearest their village, thus leading to massive colonization by toxic vegetation that ultimately prejudices stockraising; at the same time, this practice promotes soil erosion and compacting that ultimately prejudice cropping in these same fields. Only an integrated understanding of negative as well as positive interactions between subsectors and of abiotic as well as biotic constraints can explain such seemingly "irrational" behavior. For an accurate analysis, stresses and variables such as the following must be considered: the type and amount of labor that the production unit can mobilize for cultivation versus stockraising; herd size and the sex, age, and species composition of household herds; availability of capital and/or labor for fencing or for establishing grazing outposts vis-à-vis competing capital requirements for cropping; land tenure regimes pertaining to rangelands versus fields; extra-community political constraints to expanded access to land; and still more. (For detail, consult Jamtgaard 1984 and McCorkle 1987.)

Eschewing both neofunctionalism and narrow "ecologism," the SR-CRSP Sociology Project has instead taken an eclectic and truly holistic systems approach. This stance is still strongly ecologically grounded. Indeed, reminiscent of a Thomas Hardy novel, nearly every chapter in this book incorporates the biotic communities involved in the agropastoral systems under examination as active, energetic forces in intimate interaction with their associated human communities. This does not mean, however, that the SR-CRSP espouses narrow-ecological or technoenvironmental determinism. Rather, it focuses on the intermeshing of the biophysical environment with the social, cultural, economic, and political environments, and on the back-and-forth, push-and-pull among all these components at the agropastoral nexus.

For example, a recurrent subject in this volume is producers' shrewd intra- and inter-annual use of all available ecological niches (no matter how poor they may seem) vis-à-vis plant and animal growth cycles, climatic fluxes, and the contrasting and often shifting roles assigned to different crops, livestock breeds, and both plant and animal products in people's risk- and resource-management strategies and in their cash/kind or on-/off-farm tradeoffs. These roles, strategies, tradeoffs, and consequently producers' differential allocation of natural resources to cropping as versus herding are in turn conditioned by multiplex abiotic or suprabiotic considerations. These include, e.g., changes in composition of the domestic unit, family emergencies, rapidly fluctuating markets, often-closely-related vagaries in the political weather, plus other, sometimes culture-specific factors such as ritual obligations or food preferences.

Obviously, the SR-CRPS's holistic perspective has entailed studying a wide range of interrelated topics and issues (see McCorkle et al. 1989 for an overview). The resulting plethora of subject matters nevertheless finds some unity in what has come to be the overarching framework for social research within the program: the imperative of situating *any* agricultural R&D effort within its fullest possible ecological context—human as well as biophysical.

THE HUMAN ECOLOGY OF AGROPASTORALISM

The human ecology of agropastoralism can be defined as embracing all the many levels and layers of sociocultural, economic, and political structures relating to individual, intra- and inter-household, community, regional, national, and even international control over and utilization of plant and animal domesticates and the resources necessary to raise them.

At the most basic such structural level—the individual—a human ecological focus dictates systematic attention to even more elemental parameters such as gender, age, and kinship. Thus, a regular topic of SR-CRSP social research has

been the relative roles of different biosocial groups in the production, transformation, consumption, and distribution of agropastoral products. In an effort to counterbalance past research emphases on plant agriculture and males, however, the SR-CRSP has paid particular attention to the long-ignored pastoral roles of women and children in mixed farming systems.

These roles are many and culturally varied. For example, in the *despoblados* of northern coastal Peru, women and their daughters do the milking, and they make cheeses both for home consumption and sale (Chapter 2). Whether in the despoblados or the high Andes (Chapters 5 and 6), women and especially children (both daughters and sons) do most of the household's daily herding; in the Andes the children of kin and non-kin may also be enlisted. But in Kenya milking, herding, and various other pastoral chores are largely or at least traditionally the province of household men and boys (9, 10). In parts of Kenya and in Indonesia (7), women do much of the cleaning of livestock quarters (typically a male job in the Andes, however) and most of the watering and feeding of animals kept in full or partial confinement. In both Indonesia and Peru, women play significant roles in veterinary care, too. And in the Andes but not in Kenya, women also have a major say in culling and marketing animals and their products, and in deciding on the disposition of the cash thus earned. As Chapters 6, 9, 10, and 11 in particular demonstrate, it is critical to delineate such biosocially constituted roles and, further, to recognize how they may be evolving—whether at the household or societal level; whether in "real" or culturally ideal/institutionalized terms; and whether as a result of endogenous or exogenous pressures or opportunities. Only with this knowledge is it possible to design workable, equitable interventions in any agropastoral regime.

Broadening this focus on the human ecology of agropastoralism, Fernández (Chapter 6) outlines how, within a neighborhood of Andean communities, management of the multifarious tasks of smallholder agropastoralism and of the natural resource base to support it is differentially vested in a nested hierarchy of socio-economic-political units. In ascending order, these units span: individual household members, again parsed by gender, age, and their differential decision-making powers, technical knowledge, and task assignments in cultivation versus herding; households—the basic unit of production; established inter-household workgroups of males, females, or both, who collaborate in specified crop and livestock production activities; and local governing bodies, who exercise authority over community-wide issues of natural resource use. As Fernández aptly argues, a clear comprehension of the varying roles and responsibilities assigned to the interlocking units within this complex human ecology is essential if researchers and developers want to get the right information to and from the groups who have the real authority and skills to institute change in agro- or pastoral technologies and practices.

Focusing in on the lower rungs of this same hierarchy in another sierran community, McCorkle (Chapter 5) presents a detailed microlevel analysis of

how Andean agropastoralists strategically allocate their scarce human resources within and among kith, kin, fictive kin, and "outsider" households so as to daily range as many as four species of herd animals across three widely dispersed agrolife zones, all the while also seeing to the never-ending work of multicropping. This process entails producers' juggling differential nutritional requirements and caloric expenditures across diverse livestock species and varying ages and sexes of *both* humans and animals; astutely deploying individual herders according to their knowledge of a given livestock species' ethology, disease susceptibility, etc.; and carefully weighing the social and economic costs and benefits of opting for extra- versus intra-household labor. The result is a wide variety of smallscale socio-organizational tactics for mobilizing pastoral labor. McCorkle echoes Fernández in underscoring the need for an in-depth understanding of how and why producers presently deploy their human resources as they do vis-à-vis the simultaneous demands of herding and cropping. Researchers and developers can thus draw upon elements of the existing human ecology for use as valuable building blocks, models, and metaphors to stimulate agricultural change—in this case, to institute larger-scale and more efficient forms of labor organization and range management that redound to the benefit of both subsectors of production.

For yet another Andean community, Guillet (Chapter 7) extends the analysis of the human ecology of plant and animal production to shifts across time as well as across both biophysical and social space. He details how, through an incremental re-organization of water and land tenure, this community was able not only to improve its stockraising but also to enhance the fertility of its fields cum pastures. Via the auto-introduction of alfalfa (a leguminous forage), the productivity and sustainability of the agropastoral system as a whole was increased. In this instance, a rural community in effect designed and implemented its own development project! This case offers further, compelling evidence of the importance of understanding the human ecology of development. With such social intelligence, agricultural interventions are made much easier. In their efforts to improve agropastoral production systems, developers can build on and from producers' existing or evolving socioeconomic and political structures instead of struggling to impose alien ones.

Incorporating the human ecology into the analysis of agropastoral systems does not stop at the borders of the local community, however. It means going beyond, to look at broader geosocial contexts in which rural producers are ultimately embedded. For example, Guillet mentions longstanding mechanisms of cooperation and exchange between the community he studied and adjacent "pure" pastoralists of the high punas. These mechanisms allow each group to directly or indirectly exploit the agrolife zones that the other inhabits. Likewise, Mendes and Narjisse (Chapter 4) do not confine their examination of range-animal ecology and agropastoralism among the Berbers of Morocco's Atlas Mountains to a single community, valley, or montane biome. Instead, these

authors extend their analytic reach to include important socioeconomic interdependencies all along the vertical landscape that traverses 3600 m of altitude across several hundred kilometers and links the production system of highland agropastoralists to the peoples and the plains at the foot of the mountains.

In a combined diachronic and synchronic analysis that explicitly targets such interlocking cultural-ecological levels, Perevolotsky (Chapter 2) highlights mutually beneficial socio-organizational and ideological relationships between goatherders (who also raise crops) of Peru's arid despoblados and small farmers (who also keep goats) of the coastal river valleys. These linkages result in a regional level of integration across vastly different ecozones that facilitates both groups' timely access to alternative productive resources during periods of acute climatic stress. When climatic conditions are favorable, however, herders find themselves in direct competition over rangeland resources with a different group—commercial cattle ranchers. Further complicating these complementary and conflicting relationships among multiple human and natural environments are the depredations of urban wood merchants, the establishment of agricultural cooperatives, the actions of government officials and policies, and the fickleness of international commodity markets. Among other things, Perevolotsky demonstrates how a narrow ecological analysis focused primarily on climatic and biotic variables would mask other, abiotic stresses within despoblado agropastoralism, as well as higher-order sociostructural and sociopolitical constraints—all of which would need to be addressed in any effort to improve crop and livestock production in the region.

For western Kenya, Mbabu (Chapter 11) likewise offers a thoughtful exegesis of the interactions across both time (colonial, contemporary) and space (local, regional, national, international) among diverse and ever-shifting social, economic, political, and racial groupings in their struggle for control over the land and labor necessary for crop and livestock production. Using both largescale survey techniques and smallscale case-study methods, in what is perhaps this volume's most ambitious analytic effort, Mbabu ultimately links farm-level choices and strategies, actions and reactions, and especially gender impacts to the global political economy. Along with the chapters by Bilinsky and Gaylord (8), Noble (9), and Conelly (10), Mbabu's work also takes into account one of the paramount variables in the interaction between biotic and abiotic communities—vast and even frightening flows and pressures in human population.

Several chapters examine yet another segment of the human ecology of agropastoralism: national agricultural research and extension systems. The structure, functioning, and institutional culture and ideology of these systems can (and indeed should) directly impact upon producers' and nations' social and agroeconomic well-being. But the impacts will be positive ones only insofar as these organizations and their functionaries possess a clear and fully contextualized understanding of the agropastoral peoples and systems they seek to assist.

Unfortunately, as Primov (Chapter 3) observes of Brazil's National Center for Goat Research, even with the best of intentions, researchers of smallholder agropastoralism readily fall prey to the reductionistic tendencies and ethnocentrisms noted earlier. In particular, Primov warns that the research/extension establishment must ward against its proclivity to focus on a single commodity (in this case, goats) divorced from the other plant and animal domesticates in producers' overall strategy of risk and resource management. Both Primov and Conelly (Chapter 10) also caution against assuming that all of a smallholder's productive efforts are market-oriented. Such myopic views at best result in producers' rejection of new but inappropriate technological or managerial offerings. At worst, because of the delicate nexus between cropping and herding, they lead to interventions that merely rob Peter (the agro) to pay Paul (the pastoral) or vice versa—in the process defeating people's purpose in raising the commodity in the first place, or even imperiling basic human nutrition.

Bilinsky and Gaylord (Chapter 8) note that at least some of these misconceptions and the inappropriate and unworkable technological "fixes" they engender flow from an institutional culture that distances scientists from the very people they are supposed to serve. National agricultural research systems are usually heavily staffed by urbanites who may have little or no firsthand experience with farming or farmers. Nor do these scientists' R&D institutions—which have traditionally emphasized on-station rather than on-farm research—encourage them to acquire such experience or reward them for working directly with rural producers. Moreover, linguistic, cultural, and class differences may make such contact difficult. Worse still, researchers may consciously or unconsciously subscribe to societal values that stigmatize classes who engage in hard manual labor such as that entailed in smallholder agropastoralism. Bilinsky and Gaylord describe how, via the SR-CRSP/BPT Outreach Pilot Project, scientists of Indonesia's Research Institute for Animal Production (RIAP) began to grapple with some of these kinds of human-ecological problems, thereby improving their ability to design and deliver technologies more appropriate to RIAP clienteles.

Noble (Chapter 9) takes such analyses of the institutional culture of agricultural R&D even further. She details how both conscious and unconscious ethnocentrisms at all levels—from individuals, households, and communities, to projects, national political parties, and international donor organizations—can pervert program goals. Her specific concern is an ethnocentrism shared by Kenyans and many of their foreign donors: a pervasive patriarchalism that couches women's roles in agriculture and women's rights to the fruits of their own participation in agricultural development in terms of benefits to families. As Noble convincingly documents, this idiom of "benefits to families" in fact often translates into benefits for men and extra work for women (see also Chapters 10 and 11). Drawing upon SR-CRSP experiences in cooperating with a interinstitutional dairy-goat project in Kenya, Noble demonstrates how once again, even with the best of intentions, an imperfect understanding of

the human ecology of agricultural R&D leads to distorted and inequitable "development."

Of course, the final cross-cutting issue raised in this volume is the driving one behind all SR-CRSP endeavors. To wit, how can findings from the program's holistic research approach be put to practical development use so as to enhance human well-being? Or put another way, in agricultural R&D, how does the R relate to the D? It is testimony to the achievements of the SR-CRSP Sociology Project, and to the value of social research in agricultural R&D generally, that virtually every chapter in this book concludes with two, equally useful and "useable" analyses of the data presented: concrete, hands-on recommendations for developers and planners seeking workable interventions in the specific agropastoral system studied; and larger lessons learned that can, and should, be immediately applied in agricultural R&D on agropastoral systems generally.

CONCLUSION

In a sense, agropastoralism is at once the problem and the solution for many rural peoples of the developing world. To borrow a concept from the architectonics of R. Buckminster Fuller, the challenge that every agropastoralist faces is to construct a farming system with dynamic "tensegrity"—a system that integrates the tensions among its elements in such a way that each element operates with the maximum economy and efficiency possible at any given time. The corresponding challenge for agricultural scientists is, working together and with farmer-stockraisers, to understand how best to attain and then sustain such systems in specific biophysical and human ecologies. To do so successfully, tensegrity must also be achieved among many different disciplines.

Thus, collaborating closely with other SR-CRSP components and with the ultimate experts in agricultural systems analysis and operation—women and men producers themselves—the Sociology Project has sought to paint a more complete picture of the myriad interactions among plants, animals, and people in agropastoral production systems. This picture takes both synchronic and diachronic perspectives; incorporates global and regional as well as local "color" in its palette; brushes in the sometimes clashing tones in the interrelationships among agroecozones, species, and human groups; and frames all this holistically.

Indeed, the breadth and diversity of the contributions to this volume give testimony to the holistic, eclectic, and highly collaborative approach that is necessary to begin to understand, much less improve upon, the world's most common yet perhaps most complicated farming systems. To the extent that the findings reported here suggest broader principles of smallholder agropastoralism worldwide, the authors' hope is that a variety of groups concerned with international agricultural R&D will be able to profit from the SR-CRSP's first decade of research. These potential beneficiaries include: agricultural scientists; development professionals, planners, and policymakers; and above all, the "real people" who raise both plants and animals.

NOTES

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2. Throughout this introduction, "agriculture" is used in its fullest sense, to refer to either or both plant and animal production. However, on occasion the terms "plant agriculture" and "animal agriculture" may be employed for specificity.

3. The projects are currently directed by nine land-grant universities and one private research foundation. For details of program organization and operations, consult Blond n.d., Oxley 1989, and Raun 1989. McCorkle et al. 1989 or Nolan et al. 1989 provide more information on the history, structure, research results, and guiding principles of the SR-CRSP Sociology Project. For CRSPs in general, see McCorkle ed. 1989.

4. In yet another reductionistic scientific tradition that has unfortunately been accompanied by a great deal of colonially and/or officially imposed ethnocentrism, these are the often elusive "male heads of household" so much sought after in development circles as interviewees and proximate units of analysis.

5. As an overview of the full ethnographic literature reveals, however, this is something of an oversimplification both across and within Andean communities.

6. Hopefully this is changing, stimulated by the work of programs like the CRSPs, of institutions like WIIAD (formerly, Winrock International Livestock Research and Training Center) and ILCA, and bolstered by volumes like this one or that of Amir and Knipscheer (1989).

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Social Research in International Agricultural R&D: Lessons From The Small Ruminant CRSP[1]

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ABSTRACT The uses of the most "social" of the social sciences—sociology and anthropology—in international agricultural research and development (R&D) have often been poorly understood. Drawing upon a decade of work by the Sociology Project of the Small Ruminant Collaborative Research Support Program, this article exemplifies how and where social scientists can and have contributed to major development initiatives, and it illustrates some of the larger lessons to be learned for human values concerns in international agriculture.

Social Research in International Agricultural R&D

The place and potentials of sociological and anthropological inquiry in international agricultural R&D have often been poorly understood—as a large and growing literature attests (see especially the references cited in McCorkle and Gilles, 1987). Many development projects and participants—including even social researchers themselves—have often experienced difficulty identifying precisely how and where sociologists and anthropologists can "make a difference" in international agriculture.

In part, this problem arises because some non-social-scientists are understandably unaware of the range and breadth of research within sociology and anthropology, equating these fields with studies of crime, substance abuse, monkeys, bones, pot sherds, or what-have-you. However, others who *are* aware that these disciplines also treat agricultural topics may hold the more pernicious view that sociologists and anthropologists have few insights to contribute to international agricultural development that cannot be just as easily supplied by "socially sensitive" members of other disciplines (e.g. Simmonds, 1985).

At the same time, many social scientists, too, express vague or negative perceptions of their disciplines' participation in this arena—whether because of simple ignorance of agricultural development issues, the often "second class" status of development studies in academia, ethical qualms, or other reasons (see e.g. Bennett, 1988; Bowen, 1988; Hoben, 1982).

In this article, it is not our intention to re-engage the debates and complaints behind such views. Instead, our aim is a constructive one—to provide positive examples of the functions and importance of social research in international agricultural R&D by overviewing the work of sociologists and anthropologists on one major, decade-long development initiative—the Small Ruminant Collaborative Research Support Program (SR-CRSP), and its Sociology Project.

Below, the SR-CRSP's formation, function, and structure are briefly described. Then, social science inputs in defining beneficiary populations and contextualizing SR-CRSP goals and activities within sociocultural and production systems are highlighted. In the process, substantive research findings are used to illustrate some of the larger lessons to be learned for international agriculture and human values concerns from sociological and ethnological studies. Important host-country outcomes of building a social science component into program agendas are also noted. The article concludes with a discussion of appropriate roles for social researchers working in agricultural R&D, based upon "reflexive" research within the Sociology Project itself.

The Small Ruminant CRSP

The SR-CRSP is the oldest and largest of eight innovative, multidisciplinary agricultural education, research, and development initiatives established under the U. S. Congress's International Development and Food Assistance Act of 1975 and its Title XII amendment, the Famine Prevention and Freedom from Hunger Act (Lipner, 1988). The CRSP mandate is, through training and research, to strengthen the capabilities of U. S. land grant universities and collaborating foreign institutions to apply agricultural science in solving world food and nutrition problems. CRSP research focuses on enhancing the production, distribution, storage, marketing, and consumption of food crops among smallholders and the poor in less developed countries (LDCs) through design of appropriate technology.

One of the first targets selected for CRSP research was small ruminants.[2] They constitute a crop common to all LDCs, and one that is critical to such nations' food security and economy. Indeed, 56% of the world's sheep, 96% of all goats, and virtually 100% of domestic camelids (llamas and alpacas) are raised in LDCs. Equally important, the animals are primarily owned by small farmers and herders of very limited means—the majority of LDC populations.

Hence the establishment of the SR-CRSP in 1978, in collaboration with five nations representing the diversity of small ruminant husbandry systems to be found among LDC smallholders globally: Brazil, Indonesia, Kenya, Morocco, and Peru. The program spans nine disciplinary projects: animal management/production systems, range management, nutrition/forages, reproduction, breeding/genetics, health, systems analysis, economics, and sociology. To date, 12 U. S. land grant institutions and one private research foundation (Winrock International) have participated in program. An even greater number of institutions have been formally or informally involved in host countries. (For more detail, see Blond, n.

A signal feature of the SR-CRSP since its inception has been its programmatic integration of sociological and anthropological inquiry across all country sites and research areas via the Sociology Project, housed in the University of Missouri-Columbia (UMC) Department of Rural Sociology. With a decade of experience behind it, this project offers many concrete examples of how and where social scientists can and have contributed to the successful design, implementation, and evaluation of international agricultural R&D.[3] While difficult to do little more than exemplify a body of work in one brief article, throughout the text extensive reference is made to project publications so that readers can access more detail about SR-CRSP social research in specific geographic and topical areas.[4]

Targeting Development

Typologies of Livestock Producers

The first step in any successful agricultural development effort is to define setting, goals, and priorities. But even after these have been established, it is sometimes difficult to target the precise types of production systems—in terms of key socioeconomic and other farming system variables—to be investigated and assisted. Within the SR-CRSP/Peru, for example, some agreement was reached that the program should have a focus on peasant communities (Gilli, *et al.*, 1980), since about half of Peru's rural population are members of legally recognized *comunidades campesinas* (CCs), and since they control over 50% of the nation's small ruminants. However, a critical question remained as to what *type* of communities should be targeted: mixed crop/livestock farmers or more purely pastoral producers?

To answer this question, SR-CRSP sociologists analyzed data on 2716 (over 99%) of Peru's CCs.[5] Cluster analysis of this massive data base generated a heuristic typology for orienting SR-CRSP work in peasant communities (Jamtgaard, 1986).[6] Results indicated that nearly half of the sheep and over one-fourth of the alpacas held by CCs are raised by mixed, "agropastoral" farmers. These findings challenged earlier assumptions that pastoral groups owned the vast majority of small ruminants among Peruvian peasants.

Anthropological and sociological field studies further revealed that Andean agropastorialists op-

erate under a very different set of social, physical, and techno-economic constraints from "pure" pastoralists. While the latter usually live in patrifocal groups on high-altitude rangelands above 4000 m (Jiménez and Hobbs, 1986; West, 1981), the former are typically neolocal and bilineal and reside between 3000 and 4000 m. Since mixed farmers simultaneously engage in two very different production systems, their technological needs, land and labor requirements, and marketing and consumption patterns also differ from pastoralists' (Fernández and Huaylinos Sousa, 1986; Gómez Rodríguez, 1985; Guillet 1987b; McCorkle, 1983; Primov, 1981, 1983). Furthermore, agropastoral peasant communities in Peru differ from private farmers in that most of their grazing grounds are held in common (McCorkle, 1987); many production decisions are made communally (Gilles and Jamtgaard, 1982; Jamtgaard, 1984); and although each family possesses its own plots and animals, much of the daily work of both cropping and herding involves the coordination of several households (McCorkle, 1982b).

These kinds of findings from Sociology Project research have encouraged biological scientists to tailor technologies so as to better fit different socioeconomic realities among Andean stockowners. Now, program social and biological scientists are working together to design and validate technologies for use in *both* agropastoral and pastoral peasant communities in Peru (Fernández, 1986; Guillet, 1986, 1987c&d). Likewise for other types of crop/livestock farming systems in Brazil (Neumaier *et al.*, 1983), Indonesia (Gaylord and Bilinsky, 1986; Knipscheer and Suradisastra, 1986; Mawi *et al.*, 1987), Kenya (Mukhebi *et al.*, 1986; Reynolds, 1985; Reynolds *et al.*, 1983), and Morocco (Gilles, 1982c; Gilles *et al.*, 1986).

Plants, Animals, and People

The same kinds of methodological and analytic techniques used to target SR-CRSP research in Peru can be, and have been, put to work in other countries. Indeed, it is now evident that the vast majority of LDC stockowners also raise crops. In consequence, systemic interactions between plant and animal agriculture have formed a principal research topic for virtually all SR-CRSP social scientists.

Studies in each of the five sites have repeatedly emphasized the web of social, cultural, technological, economic, ecological, and even sociopolitical interrelationships between crops and livestock in smallholder farming systems—e.g. for Indonesia, Ihalauw, 1983; Suradisastra and Nolan, 1983; for Kenya, Campbell *et al.*, 1984; Mbabu, 1988; Noble and Nolan, 1983; Reynolds, 1986a&b; for Morocco, Mendes, 1986; and for Peru, Espinosa, 1985; Fernández *et al.*, 1986; Guillet, 1987a; Perevolotsky, 1987.

The larger message to emerge from this body of research is unequivocal: development efforts aimed at increasing animal production and productivity in mixed farming systems cannot ignore the fact that plant crops simultaneously compete for households' scarce land, labor, capital, and technological skills and resources—and vice versa.

A good example comes from Sociology Project research on the introduction of new forage crops in western Kenya, where dramatically increasing population and land pressure have equally dramatically decreased grazing resources. In consequence, in many regions household herds have shrunk to a fourth of their size only a generation ago—with concomitant declines in family nutrition and economy. Searching for a way to offset the loss in feed, animal nutritionists and forage specialists on the SR-CRSP set up a massive plan to screen numerous types and methods of cultivated forages, using plant palatability as one of the major criteria for selecting species to be screened.

Before this massive plan was fully operationalized, however, preliminary research by SR-CRSP anthropologists revealed that, not surprisingly, farmers' acceptance of cultivated forages would largely depend upon a very different criterion—the amount of land robbed from food crops for humans. Enhancing livestock production would achieve little if family plant-food staples were thereby diminished. This finding led to an immediate reduction in the number of species to be screened; an emphasis on dual-purpose food/feed crops; and a focus on land-conserving cultivation methods like fence-row planting and intercropping. This is but one example of how social research saved program time and money and greatly increased the chances that new technology would be useful to, and adopted by, the people that most need it.

Such tensions between crop and livestock production and between human and animal needs are particularly evident in SR-CRSP studies of the organization of labor and decision-making responsibilities by sex and age, within and across households of LDC farmer-stockraisers (e.g. Bilinsky, 1986a&b; Conelly and Nolan, 1986; McCorkle, 1986b). Drawing upon these and other data, project anthropologists are currently refining a cross-cultural model of the multiplicity of interactions, both positive and negative, among plants, animals, people, and the physical and human ecology they all inhabit.

Program Versus Producer Perspectives

Precisely because of such complex interactions, among many LDC producers small ruminants are valued not so much for their yields of animal products and cash *per se* as for their role in households' overall survival strategy. Small ruminants are only one component within integrated systems of resource and risk management. As SR-CRSP sociologists discovered, programs' and producers' perspectives on what constitutes appropriate livestock development may therefore differ considerably. The former commonly assume that animal products and profits are more important than the animal production system itself. Accordingly, developers seek to enhance livestock quality and hence marketability in the most cost-effective manner. While this assumption is essentially valid where production is geared to market sales, it does not fit subsistence-oriented systems (Primov, 1985).

For example, smallholders in the drought-prone *sertão* of northeast Brazil keep goats primarily as a low- or no-cost hedge against drought, to supply basic family needs for cash and meat during these difficult periods. But people devote little time, capital, veterinary or other care to their goats, which largely manage on their own (Neumaier, 1986; Primov, 1982, 1984). Instead, producers prefer to invest in more lucrative livestock (sheep and cattle) and cropping enterprises.

Thus, goats in the *sertão* serve as an emergency backstop when other productive activities fail. The animals themselves are not a priority production area. In such cases, development strategies calling for increased capital investment in herd quality will likely be rejected, since they would essentially defeat producers' purpose in raising goats in the first place. However, interventions entailing modest extra inputs of labor or slight shifts in husbandry practices in order to maximize the quantity of goats, and thus the absolute numbers surviving droughts, might be accepted.

Elsewhere, both such moves might be appropriate. For example, in the arid *despoblados* of northern coastal Peru, goats constitute a central element in smallholders' overall production system (Espinosa and Rojas, 1985; Perevolotsky, 1985a&b). Moreover, the animals and their products are expressly raised for market profit, as well as for subsistence in a highly unstable environment.

In short, developers must comprehend the place of each commodity in the total system of risk and resource management before they can design appropriate interventions. Social research plays a critical role in promoting such comprehension by delineating producers' goals and production system parameters.

Products and Production Systems

In like vein, sociological and anthropological investigations in highland Peru have found that a primary small-ruminant production emphasis among most stockraisers there is not meat, fiber, or cash. Instead, it is manure. This is hardly surprising given that peasant stockowners in the sierra also produce the bulk of the nation's staple food crop, potatoes. And as these Andean agropastoralists point out, "Without the fertilizer that our animals give us, we would have no potatoes" (McCorkle, 1983).

Independent research by soil scientists confirms this view. SR-CRSP sociologists have found that peasant households typically require one-and-a-half to two tons of manure annually for their fields (Jamtgaard, 1984). The dung is collected and stored in the corrals where herds are quartered each night. When the planting season arrives, the year's manure production is carried to the fields and mixed into the earth as the potatoes are sown. After the harvest, livestock graze the fallow fields, manuring and reseeding them in the process. Herds also utilize the high-altitude rangelands where cultivation is impossible. The animals thus render the plant resources of this otherwise nonproductive biome useful for agriculture. Ruminants process the tough Andean grasses into precious fertilizer, and even obligingly transport it down to the croplands below.

In addition to its critical role in Peruvian agriculture, manure constitutes nearly the sole source of cooking and heating fuel in the frosty, treeless heights of the Andes. It is also useful in constructing adobe houses and corrals. Indeed, so valuable is this small-ruminant product that, besides being bought and sold, in many Peruvian communities it can be used almost like money—to pay for agricultural labor, rent croplands, or lease corrals. It is even exchanged as a gift among friends and relatives.

Fuel and fertilizer form part of the "bottom line" of human existence in the harsh, cold sierra environment. Since there is almost no source of fuel other than dung, and since chemical fertilizers are prohibitively expensive for most peasants, this critical resource understandably tends to overshadow other small-ruminant products in significance.

As documented by SR-CRSP social scientists, the "bottom-line" importance and the multiple uses of manure in the Andes help to explain one behavior which has puzzled some researchers—peasants' seemingly "irrational" reluctance to slaughter aged, ailing, or otherwise unthrifty animals. Peasants' herds often include many animals that are long past their reproductive prime and their meat-, milk-, or fiber-producing peak. But these same animals do continue to produce desperately needed manure.

This is one of the principal reasons for peasant agropastoralists' conservative culling practices.

In sum, social scientists found that many Andean families gear their livestock operation to maximizing manure output. This finding has clear implications for interventions in the production system. For example, these families would resist range managers' recommendations to regularly graze herds in the relatively richer pastures of the high *punas* rather than in the heavily overexploited environs of the village. Why? Because the distance that animals can be ranged is sharply limited by the need to return them nightly to the family's central residence so as to facilitate manure collection.

In broader terms, the role and importance of even the most humble animal products within non-Western farming systems and household economies must be carefully assessed before *either* crop or livestock development plans are laid. Otherwise, developers run the risk of directly imperiling human survival.

Women and Small Ruminants

Since its inception, the SR-CRSP Sociology Project has been studying women's roles in animal husbandry (Nolan, 1985a). Findings reveal that women in Peru (Bursten and Abuhadba, 1987; Fernández, 1987, 1988; Fernández and Salvatierra, 1986), Indonesia (Wahyuni *et al.*, 1987), and Kenya (Connelly *et al.*, 1986, 1987; Noble, 1986; Noble and Nolan, 1982) play significant or even primary roles in the care and feeding of small ruminants and in major production and management decisions as well.

Among Peruvian agropastoralists, for example, women (and children) generally see to the daily herding and health care of ruminants, while men devote most of their time to cultivation. Women therefore control most of the technological knowledge relating to animal nutrition and range flora, livestock diseases and reproduction, product processing and marketing, *etc.* Given longstanding male biases among both U. S. and host-country researchers, however, early SR-CRSP efforts in Peruvian peasant communities were principally directed to men. Community response was accordingly lackluster. Based on SR-CRSP social scientists' documentation of women's primacy in Andean livestock management, however, the program soon began to actively involve women in the R&D process. Only then did the program really "take off."

In like vein, socioeconomic investigations on the SR-CRSP/Indonesia documented a strong sex bias in earlier survey research on women's roles in small ruminant husbandry. When only men are interviewed, the extent of women's participation in livestock labor and decision-making is masked. Restudies by SR-CRSP social scientists served to point up Indonesian women's multiple responsibilities for the herding, feeding, and veterinary care of household sheep and goats.

The situation in Western Kenya is more complicated. Traditionally, it has been culturally unacceptable for women there to keep livestock other than poultry. However, this tradition is changing rapidly. With growing population and hence increasing male out-migration, more and more women have become *de facto* household heads and farm managers. And along with men, they are expressing keen interest in raising the dual-purpose goat that the program is developing in Kenya. This breed offers both meat and, especially, milk (families' principal source of high-quality protein) that is sorely needed in household economies and diets.

At the same time, however, project anthropologists have revealed that introduction of this new breed can disproportionately increase women's workload. Because the goats are tethered rather than herded, water and feed must be brought to them. Throughout Africa, carrying water is traditionally a female chore. And in rural Kenya, where production of food/feed crops is seen as primarily women's work, the task of cutting and carrying crop byproducts to animals has largely fallen to household females. Other studies by SR-CRSP sociologists have detailed how, even when Kenyan women are willing to shoulder the extra work of dairy-goat keeping in hopes of improving family nutrition and/or discretionary income, the benefits of their labors are often appropriated by men.

In sum, SR-CRSP social research has emphasized the need for explicit recognition of the important contributions women make to animal production, and of the potential impacts (both positive and negative) upon women's lives that development interventions may have. As a result of social scientists' input, in designing and testing new technology for and with producers, the SR-CRSP has paid special attention to insuring that the "real" stockraiser is taken into account when new ideals are tried.

Designing Development From The Bottom Up

Traditional Resource Management Systems That Work

In Morocco's High Atlas mountains, a 300-year-old system of pasture management is being studied by SR-CRSP rural sociologists and range managers. Data on traditionally protected pasture areas known as *agdals* (Artz and Jamtgaard, 1985; Mendes, 1987) indicate that this ancient system is simple, inexpensive to manage, and environmentally sound.

SR-CRSP sociologists have further found that, as a means of optimizing returns from rangelands, traditional systems rely more on regulation of the length of the grazing season, socially flexible and/or hierarchized rights to rangelands, and controlled use of wells (Gilles, 1982b). This contrasts with Western practices and most range management projects, which instead emphasize fixed stocking rates, rigid control of herd movements, and privatization of pasture rights. But pastoral groups understandably resist efforts to diminish herds' size, circumscribe livestock mobility, and limit access to traditional grazing grounds (Gilles, 1982d).

Examples of peoples who have successfully sustained their rangelands for hundreds of years can be found in many parts of the world. Combining SR-CRSP research on Moroccan *agdals* with the global scientific literature on pastoralism helps explain why so many range development projects have failed. They are too often grounded in the assumptions and historical evolution of range science in the West.

Such cross-cultural comparisons also point the way to solutions for livestock development problems in other arid and semi-arid parts of Africa, Asia, and Latin America (Artz *et al.*, 1984; Gilles, 1982a, 1986, forthcoming; Gilles and Jamtgaard, 1981, 1988). They suggest that development programs could more profitably adapt indigenous social, political, and juridical structures that equitably distribute and sustain rangelands—instead of imposing controls derived from unacceptable (and unworkable) alien models.

These and related studies in the sociology of range management have influenced the conduct of SR-CRSP research in at least two ways. In Peru, for example, they have stimulated increased scientific interest in the utilization of native rangelands and vegetation, as versus the predominant paradigm of introducing expensive, exotic, cultivated forages. More broadly, by challenging the conventional wisdom that range management in the Third World is "just a social problem," they have outlined critical new directions for technical research. Range scientists now need to describe and analyze the ecological dynamics of traditional range management systems—giving particular attention to the phenology of little-studied native flora—with the same care that they have heretofore lavished on Western-world systems and biota.

Building upon Indigenous Knowledge Systems

Veterinary concepts and techniques among Quechua Indians of Peru form another subject of comparative research on the SR-CRSP. Andean veterinary etiologies and disease classifications run the gamut from supernatural Incaic ones such as "evil winds" and invading spirits, through 16th-century Spanish notions like "hot" versus "cold" diseases, to naturalistic explanations like dirty corrals, contaminated drinking water, and loco-weed poisoning (McCorkle, 1982a, 1988). These and other native descriptions of animal ills and their clinical signs, causes, cures, and prophylaxes have been examined in light of Western veterinary medicine, and their accuracy and utility assessed.

Interrelating folk and scientific systems of veterinary vocabulary, theory, and practice is an important part of efforts to improve animal health and, with it, herd productivity and herd owners' economic and nutritional well-being (McCorkle, 1986a). First, such analyses reveal where indigenous knowledge systems could most profit from Western scientific information. Second, they provide an intelligible ethnoscientific idiom for communicating this information. Otherwise, new practices run the risk of being feared, misunderstood, and misapplied by the very people they are designed to benefit.

Third and perhaps more important, indigenous techniques often have real "scientific" value. SR-CRSP microbiological analyses and on-farm trials have demonstrated that a number of items which social scientists identified in Andeans' veterinary pharmacopoeia are in fact effective in assuaging diarrheal diseases or combatting endo- and ecto-parasitic infestations. Teams of SR-CRSP social and biological scientists are therefore working with Peruvian stockowners to test local medicinal herbs, so that peasants themselves can prepare cheap and more reliable home remedies—thereby also freeing themselves from alien, uncertain, and exploitative external sources of veterinary inputs (Fernández, 1986; McCorkle, 1989). This bottom-up approach to technology design and delivery illustrates the power of ethnoscientific research in focusing development efforts on cost-effective and truly "appropriate" technology.

Institutionalizing Social Research in Development

At the beginning of the SR-CRSP, one problem facing U. S. social scientists (including economists) was a lack of counterparts in collaborating LDC institutions. This was not surprising since most of these organizations were largely oriented only to biological research on animal and/or plant crops.

This meant, first, that social and economic researchers had to be trained as part of the program. Indeed, one of the CRSPs' primary objectives is to provide advanced training for both U. S. and host-country participants. To date, the Sociology Project

has supported formal education for 39 individuals at diploma/certificate (5), BA (8), MS (18) and PhD (6) levels.[7] Nearly half of these trainees are women, and approximately 84% are citizens of the SR-CRSP host countries.

Second, it was necessary to find a place for social and economic research within host-country institutions. While the welcome extended to non-biological investigations varied across the five SR-CRSP sites, by 1984 the value of such studies had become apparent to collaborating organizations, and new institutional structures were created.

A good example is the establishment of a socioeconomics units within EMBRAPA's National Goat Research Center in Brazil. A similar unit was formed within the research division of Kenya's Ministry of Livestock Development; and Kenyan sociologists and economists were recruited to work as SR-CRSP counterparts and given doctoral training in the U. S. Parallel developments have occurred in Peru. And in Indonesia, the socioeconomics unit of the Central Research Institute for Animal Science has been strengthened through graduate training, financial support to research, technical assistance, and microcomputer acquisition.

Creation or enhancement of such units, with adequate resources and well-trained staff operating *within* LDC agricultural research organizations, is one of the most important outcomes of the SR-CRSP's social science projects. It means that local scientists can provide the necessary socioeconomic and ethnological feedback to future programs in their countries. This kind of human-resource and institution building is key to real and sustained development. As host-country counterparts are trained and return home, they will assume the major responsibility for the conduct of SR-CRSP research on-site; and the role of U.S. scientists will shift to one of consultants and colleagues. This should be the ultimate goal of any foreign assistance program.

Defining Social Science Roles in Development

While sociology and anthropology have formed an integral part of the SR-CRSP since its inception, if the truth be told, their role was not well defined in the early days of the program (Nolan *et al.*, 1989). At the time, many SR-CRSP scientists—social and biological/technical alike—had little experience in integrated, interdisciplinary activities, not to mention the multi-institutional and cross-national collaborative mode of CRSP research. As the first such program to be initiated, the SR-CRSP in effect had to elaborate an original operational model for what was little more than an idea on paper.

Defining the social sciences' place on a program to study sheep, goats, llamas, and alpacas was challenging. Initially, there was little agreement across program participants, or even among social scientists themselves, on how best to utilize social research in this multidisciplinary endeavor. Many assumed that the social sciences should merely function in a service role—determining how to transfer the technological innovations devised by the biological/technical sciences to LDC smallholders.

However, as the program evolved, so did both groups' conception of the uses of sociological and anthropological inquiry. Across a decade of SR-CRSP work, project social scientists have understandably been stimulated to periodically reflect upon their place in the development process, in an examination of what might be termed "the sociology of sociology in agricultural R&D." One outcome of this iterative introspective has been better definition of the multiple humanist, "integrationist," and communicator roles to be played by social scientists in this arena.

The central concern of the sociology of agriculture is the impact of proposed technological interventions on human well-being. In this regard, social scientists play a key role in defining appropriate target populations, and informing and monitoring the equitable distribution of development benefits to them—e.g. as detailed in the sections on Andean agropastoralists and on women and small ruminants. In a sense, sociologists and anthropologists serve as "conscience minders" on development programs—although sometimes they are instead perceived as "nay-sayers." Along with professional and ethical concerns (Stanford and Campbell, 1984), such statuses and stereotypes of social analysts' participation in development have formed a major topic of "reflexive" research on the Sociology Project (Campbell *et al.*, 1981; McCorkle and Gilles, 1987; Nolan, 1985b).

As (if not more) important than such monitoring or "minding" functions is substantive social science input at the technology design stage. Early integration of social science information on producers' current practices and resources, their family goals and needs, political-economic constraints, and so forth can profitably orient and link biological research to the complex human ecologies it is supposed to benefit. As Sociology Project findings on the role of goats in the *sertão* or manure in the Andes illustrate, social research can suggest concrete directions in which biological/technical research should, or should not, go.

In the long, and even the short run, including social science in the research agenda is a good in-

vestment—as the case of cultivated forages in Kenya dramatically documents. Social research can directly increase the chances of development success, while at the same time saving on scarce financial and human-scientific resources (not to mention, frustrations both for biological scientists and for producers). Moreover, information from sociological and anthropological investigations can identify new needs in basic biological/technical research—as the analyses of indigenous range and veterinary management systems illustrate.

However, for their successful actualization, all these roles ultimately depend upon effective communication among development disciplines, practitioners, and beneficiaries. In this regard, SR-CRSP sociologists and anthropologists have also been instrumental in prodding their non-social-science colleagues out of their labs and research stations into direct contact and dialogue with producers, and in serving as "translators" between these groups. In addition, project social scientists have conducted focused studies of communicative processes on the SR-CRSP and other programs. These studies have worked to define gaps in and barriers to effective communication both within and without development programs, and to spell out concrete strategies for bridging them (Esslinger and McCorkle, 1986; McCorkle *et al.*, 1988).

Indeed, this article itself constitutes one such communication strategy. Our hope is that it will foster a better understanding among scientists of all disciplines of the hands-on tasks, practical contributions, and scientific and humanistic value of social research in international agricultural R&D.

Notes

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2. Subsequent CRSPs have targeted beans and cowpeas, fish, peanuts, sorghum and millet, human nutrition, and tropical soils. A forthcoming volume (McCorkle, ed., 1989) presents detailed analyses of the role of sociological and anthropological research on five CRSPs.
3. A majority of the examples presented here come from Peru, the first host country in which the Small Ruminant Program initiated field research. Particularly for the Sociology Project, findings from this site are more extensive than for others, which began field operations later and/or concluded earlier (e.g. Brazil, Morocco). We might also note that Sociology is the only one of the program's nine projects to have worked in all five host countries.
4. Along with the Blond n.d. volume, all Sociology Project technical reports are available on interlibrary loan from UMC. The reports are also housed with the U. S. National Technical Information Service (NTIS), the Applied Anthropology Collection of the University of Kentucky, the Pastoral Development Network of the U.K.'s Overseas Development Administration, the Commonwealth Agricultural Bureaux International (CABI), and the Information Centre for Low-External Input Agriculture (ILEIA) in The Netherlands.
5. Based on a 1977 study conducted by the Peruvian government, this typology was elaborated in collaboration with Peru's Dirección de Comunidades Campesinas y Nativas and DCCN researchers Victoriano Cáceres, Iván Pardo Figueroa, and José Portugal.
6. SR-CRSP veterinary researchers collaborating in various phases of this work include A. F. Alexander, Francisco Arévalo, Hernando Bazalar, Zenon Choquehuanca, and Mowafak Salman.
7. These figures sum to more than 39 because a number of individuals were supported for more than one degree.

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9

WOMEN, MEN, GOATS, AND BUREAUCRATS: THE SAMIA WOMEN'S DAIRY GOAT PROJECT[1]

Amanda Noble

In 1973 the U.S. Congress amended the Foreign Assistance Act of 1961 to recognize that "Women in developing countries play a significant role in economic production, family support and the overall development process" (U.S. Congress 1973:4, the "Percy Amendment"). The document also called for particular attention to activities "which tend to integrate women into the national economies of foreign countries, thus improving their status and assisting the total development effort" (ibid.). This led to policy changes within the U.S. Agency for International Development (USAID). In 1974 USAID mandated incorporation of a "conscious concern" for women in all programming processes—concept, design, review, implementation, and evaluation. Also in 1974, USAID established an Office for Women in Development (WID) charged with implementing Agency policy in this area and planning and carrying out activities in coordination with overseas missions (WID 1978). Coincidentally, the United Nations (UN) General Assembly proclaimed 1975 International Women's Year. It also designated 1976–1985 the Decade for Women, focusing on the themes of equality, development, and peace, and directing UN members to assess the economic position and progress of women in their countries

These events did not take place in a vacuum. They emerged from observations that most efforts to improve productivity in agricultural and other economic enterprises have been directed at men, despite the key role that women play in food production and commerce in many developing countries (DCs). Moreover, rapidly mounting evidence indicates that DC women bear a disproportionate share of the costs of economic development while men receive most of the benefits (Beneria 1981, Boserup 1970, Buvenič and Youssef 1980, Nelson

1981).[2] In part because of traditional gender divisions of labor in agriculture, many agricultural development projects have actually increased the burden of work for women, especially in sub-Saharan Africa. These observations and criticisms of development planning moved WID issues from the periphery to the center of development dialogue (Goddard 1985) and led to greater political and economic support for programs to help women in developing countries. One form this support took was the establishment of women-specific projects.

WOMEN-SPECIFIC DEVELOPMENT PROJECTS

The primary rationale for women-specific projects is to limit eligibility for benefits to women. The WID office contends that there is fundamental agreement within the development community "that the end goal [of any intervention] is full incorporation of women as equal partners in the development process," but that "in the short run, women-specific . . . projects are required" 1978:4). Many development experts in fact do agree with this assessment, arguing that such projects can offer the quickest, easiest, and often the most effective response to women's demands for programs (e.g., Tinker 1981). They base this argument in part on the structure of gender roles and stratification in DCs, claiming that there are many gender contexts in which it makes sense to consider such planning. Examples include the following (after Dixon 1980:10–1).

- When local cultural values proscribe public association between unrelated males and females.
- When girls and women need special programs to overcome past discrimination and help them "catch up" with men; e.g., in training for skills and professions previously closed to them.
- When women represent a high percentage of de facto household heads because of high rates of marital instability, widowhood, or male emigration.
- When in the prevailing division of labor, women specialize in tasks that could significantly benefit from assistance to increase their productivity and the returns to their labor (e.g., food production, stock raising, vegetable marketing).
- When men are likely to capture the returns to women's labor; for example, because men are the marketers of goods produced by women or because men, in their role as household heads, constitute the formal membership of cooperatives that nevertheless rely on women's work.
- When women desire activities of their own, such as revolving credit clubs or marketing associations, in order to achieve a measure of self-reliance or to avoid conflict and competition with men.

Despite these compelling arguments, there are drawbacks to women-specific projects (Buvenič 1986). For one thing, they are often isolated and plagued by communication problems. For another, they are invariably small because the bulk of development funds are channeled into "more important" initiatives. Even within WID, women-specific initiatives rank at the bottom of the list for funding priority. "Often designated 'shelf projects' . . . they wait on the shelf for fiscal year-end funding if bureaus are unable to move other money" (Staudt 1985:98). Moreover, among the few women-specific projects with economic aims that do win funding, most ultimately evolve into mere welfare action that delivers information, education, and handouts to poor women in their roles as wives and mothers.

There is a further dimension to the debate on women-specific projects. In a study of organizational behavior within USAID, Staudt (1985) found that the gender redistributive policy mandated by the Percy Amendment is in fact mediated by ethnocentric gender ideologies among male policymakers. In terms of Western notions of appropriate public and private spheres for each gender, male bureaucrats tend to interpret the channeling of resources directly to women as an intrusion upon family life and a threat to male authority. But as Staudt points out, these USAID bureaucrats' concept of a private family sphere may be inappropriate to many DCs, where women are more publicly active in agriculture, trade, wage labor, and the economic support of their families. Male bureaucrats have also raised questions about women-specific projects' causing marital separation and even community factionalism along gender lines. Of course, such questions "were unheard of for the numerous projects that included only men" (Staudt 1985:98). Male policymakers frequently argue that benefits from projects in which men participate will properly and naturally flow to women by virtue of their family membership.

In understanding the gender and policy implications of such perspectives, the concept of "resource dependency" is important (Pfeffer and Salancik 1978). No organization is completely self-contained. It is embedded in, and dependent upon the resources of, still other organizations. Organizations survive by meeting the demands of the various interest groups that support them. And these groups' gender ideologies have a direct impact upon the "success" of women-specific projects.

In sum, women-specific projects have been controversial from the outset. This chapter addresses the debate over such programs drawing upon nine months' research between July 1980 and March 1981 on the Samia Women's Dairy Goat Project (SWDGP), an effort aimed at an agropastoral area of Western Kenya. Here I argue that such projects can all too easily end up reproducing women's subordinate economic and social position, or even deepening their immiseration. Two factors contribute to this unfortunate process: indigenous gender roles and stratification that limit women's social and economic possibilities; and bureaucratic gender ideologies that define development planning

l practices at project sites and that shape policy in international development ıncies.

The data presented here derive from three sources. First, structured, open-led interviews were conducted with 71 women at four SWDGP sites. These ɛrviews elicited general information on participants' and their husbands' work l decisionmaking patterns, along with more detailed data on the project itself. ɔond, 77 students of the three secondary schools in the project area were ed to write essays on the division of labor in domestic work, cropping, and ecially stockraising at their homesteads. Third was participant observation l daily fieldnotes on the goat project and its members.[3]

THE SAMIA WOMEN'S DAIRY GOAT PROJECT

The Samia Women's Dairy Goat Project was begun in 1979, in the Samia ation of Western Kenya's Busia District (Figure 10.1). The project had nerous sponsors, including: a woman member of Kenya's parliament; a private ividual working with the Friends of the UN; the UNDP (UN Development gramme) Sheep and Goat Development Project, which assigned a fulltime nical assistant to train participants in goat husbandry; the Ford Foundation, ich supplied funds for building materials; Heifer Project International; the all Ruminant Collaborative Research Support Project (SR-CRSP), which endeavoring to breed an improved, dual-purpose meat-and-milk goat; and NICEF, which mobilized women at the SWDGP sites to adopt new village-el technologies like solar driers, mud stoves, and improved granaries.

The aim of the project was to introduce intensive husbandry of dairy goats a region where animals were few but feed resources were plentiful. In the cess, the SWDGP sought to fulfill two explicitly stated goals: to improve rition among rural Kenyan families, and to increase women's income. These ls were to be achieved by organizing women into *boma* production units in h of Samia's ten sublocations. "Boma" here refers both to the women's groups l to the goathouses around which they were formed. The latter consisted of ɛened-in quarters to protect the animals from insects like tsetse flies and s. This kind of intensive, confinement system of animal husbandry represents eparture from traditional Kenyan techniques, in which goats are herded or ıered.

The SWDGP hoped to build one boma, designed to hold about 70 animals, each of Samia's ten sublocations. By 1981 eight bomas had been constructed. na membership ranged from approximately 30 to 50. The formation of nen's organizations was not new to SWDGP members; 79% of interviewees belonged to one or more other women's groups.[4] To join the SWDGP, nen paid Ksh 5 (less than U.S. $1.00), and each boma elected its own cials: a chair, vice-chair, secretary, vice-secretary, and treasurer. In addition, project hired a watchman and a herder, both male, at each boma.

Group meetings were held weekly, bimonthly, or monthly to deal with the general care of the project goats and with boma management. The organization of labor was a major issue at most meetings. Attendees would be assigned tasks to perform until the group met again—e.g., fetching water, providing forage, cleaning animal quarters, or milking. In some bomas, money was collected to pay the workers; but in others, women received no pay. Meetings also served as an occasion to discuss personal problems and other matters. Thus the groups had informal as well as formal functions and spanned both public and private domains.

Among the four bomas studied, one was stocked with Anglo-Nubian goats, another with Toggenburgs, and the remaining two with the indigenous Small East African goat. The European breeds were managed under a zero grazing system, with cut-and-carry forage brought to the penned animals. The bomas stocked with indigenous goats relied upon more traditional herding and tethering methods.

At one boma, crossbreeding was underway in an effort to produce a disease-resistant dairy animal. Organizers promised sufficient production of crossbred animals so as to give all SWDGP members a few for household use. This distribution scheme was elaborated with several aims in mind: to entice women to join the bomas; to convince their husbands that, in the long run, the men would profit from the immediate loss of labor that their wives' participation would entail; and to keep morale high despite slow progress. Along with the original purebred dairy goats, any surplus crossbreeds were to remain in the bomas under the management of the women's groups. Decisions about the sale of these goats and distribution of the earnings were to be made jointly by the members. Project sponsors planned for the crossbred goats to be marketed locally. Earnings from sales of the first offspring were earmarked to fund construction of subsequent bomas. The second offspring and/or income from their sale were to be managed by participants. In reality, however, project sponsors instead moved the second offspring to newly established bomas in other sublocations. This postponed production of enough crossbred goats for the first participants' household use far into the future.

In any case, the price of constructing household bomas to stable three or four crossbred goats proved prohibitive. The group bomas cost approximately Ksh 18,000 or U.S. $2500 apiece to build, due to the high price of screening material, corrugated tin roofs, water tanks, and imported lumber. Experiments with household-sized bomas yielded a structure that cost approximately Ksh 200 or U.S. $20.00. While not excessive, this sum was beyond the means of most families. Although loans might be arranged, most people felt it would be too risky to invest so much money in exotic animals with unfamiliar and complex husbandry requirements, plus as-yet-uncertain characteristics and returns.

Although an ultimate SWDGP goal was project self-sufficiency, the sponsorship created dependency on external resources from the outset. Moreover,

he sponsors' unilateral decision to move animals to other bomas raised questions n some minds about who really controlled the project—participants or outsiders? This brief overview of the SWDGP sets the stage for analysis of project lynamics in terms of gender roles, stratification, and ideologies.

GENDER ROLES AND STRATIFICATION IN SAMIA

In many societies goats are, like poultry, a "women's animal" (Beaman 1983, Cloud 1977, Henderson 1980, Martin and Voorhies 1975). Moreover, when nen emigrate, women's responsibility for livestock generally increases (LeVine 1966). In such circumstances, livestock projects for women may well seem ogical. However, gender divisions of labor in Samia militate against this logic. Traditionally, men and boys tended goats and cattle, and men were responsible or physical maintenance of the homestead and for most trading activities. Women and girls carried out the bulk of cultivation tasks, especially hoeing. (For cultural contrast, see Fernández or McCorkle this volume.) Women also cooked, fetched water and firewood, gathered wild foods, and processed food-grains. Men and children joined the women in planting, weeding, and harvesting (after Wagner 1939).

These traditional role definitions remain little changed, even in the face of major socioeconomic shifts that have forced rural men throughout Kenya to emigrate for wage work (Mbabu this volume), leaving their wives behind as *de facto* household heads. Reliable estimates place the number of female-headed households in Western Kenya at about 40% (Moock 1976, Staudt 1976). Among the 71 SWDGP participants surveyed, 31% of their husbands were working outside Samia during the interview period. Moreover, the husbands of 84% had a history of emigrant wage labor; and over half the interviewees listed waged work as their husband's principal occupation, rather than farming (38%) or fishing (6%). Nevertheless, males retain strong authority over livestock. This is clearly evidenced in both the essay and the interview data collected during field research in Samia.

Gender Roles in Livestock Labor and Decisionmaking

Student essays on the gender division of labor in their homesteads unequivocally asserted that women are not responsible for the family ruminants in Samia. Ninety-two percent of the 77 essayists indicated that the only livestock cared for by a female at their homestead is chickens. Some students explained this by the fact that at night chickens are housed in the kitchen, the domain *par excellence* of women. Other students did not associate any one gender or household member with poultry raising. Instead, they wrote that their family's hens "look after themselves," thus disavowing the importance, or even the

existence, of any labor linked to poultry raising. Moreover, many students noted that their fathers decide on the slaughtering of chickens for ceremonies or guests.

With very few exceptions, management of ruminants was cited as the male head of household's domain, with considerable assistance from sons. As one female student put it, "The care of animals as we know very well, a female type of person cannot do this job." Again and again the essays stated that fathers and sons care for sheep, goats, and cattle. They, not women and girls, are ideally responsible for grazing, selling, and slaughtering these animals.[5]

A number of essayists also addressed changes that occur when fathers are absent or deceased. Many indicated that their mothers then become the "household leader" and the "farmer" of the family. However, such observations were often qualified with statements like "When my elder brothers are around, they normally become the household leaders" or "[Although] On my father's absence, the household is looked upon by my mother, . . . when he's around, he's the one who roars." Such responses imply that while a woman may take functional charge of the household in her husband's absence, this may not reflect a real change in roles. The facts that older sons are consulted and that fathers return to "roar" suggest that female control is tenuous at best.

Furthermore, if women in such households were in actual control of livestock one would expect animal husbandry chores to be part of the normal ensocialization process for girls. But none of the women interviewed said anything about their daughters' helping out with pastoral work. They cited only traditional female tasks. These center on agricultural and culinary chores: hoeing, weeding, fetching wood and water, grinding grain, and cooking. Coupled with the essay data, this finding suggests that while role behavior may be changing out of necessity, role definitions and ensocialization patterns are not.

Possibly because of bias from the presence of a female researcher and/or from the research topic itself (a women's livestock project), interviewees presented a somewhat less traditional view of women's roles in animal husbandry than did essayists.[6] Forty-six percent of the 71 SWDGP respondents indicated that care of the family goats is either a man's job or a shared responsibility. However, 24% said it is a woman's job; and another 24% answered that it is a man's responsibility but that, for various reasons, women do the work (Table 9.1). All but one respondent explained this as a result of men's absence from the homestead, whether working elsewhere or just "not around." As one interviewee summed up, "Women care for goats when men are away. They [women] are supposed to do everything."

The women's responses about economic decisionmaking with respect to livestock were more traditional. A majority indicated that it is the husband's decision to sell (63%) or slaughter (69%) animals, although a majority (58%) also felt that the wife would make all such decisions if her husband were absent (Table 9.1). Still, 21% indicated that she would do so with the help of a male relative or neighbor; and another 21% said she would have to contact her

TABLE 9.1 INTERVIEWEE REPORTS OF GOAT MANAGEMENT AND LIVESTOCK DECISIONING

QUERY AND RESPONSE	PERCENT RESPONSES (n = 71)
Who is responsible for managing goats?	
Women	24
Men	13
Both – a shared job	34
Men; but women sometimes do it	24
Children	5
Who decides when to sell livestock?[a]	
Men	63
Women	0
Both – shared	37
Who decides to slaughter?[a]	
Men	69
Women	0
Both – shared	31
Who makes these decisions when husband is absent?[a]	
Wife alone	58
Wife with advice from male relatives/neighbor	21
Wife with permission from husband	21

[a]Includes cattle and sheep as well as goats.

husband first. However, participant observation revealed behaviors suggesting that some of these claims may be overblown. During fieldwork, frequent visits were made to a weekly livestock market in Samia. On only one occasion was a woman ever observed selling a goat. When questioned, she explained that she had written to her husband "begging his permission to sell the goat to help with school fees." In contrast, women as well as men were regularly seen selling chickens. It is also noteworthy that chickens are sold in a different part of the market, thus underscoring goats' status as a category of livestock apart from poultry and other "female" crops.

Male Authority Within the Family

A broader issue, but one closely linked to the gender division of agropastoral labor, is the distribution of power and decisionmaking responsibility within Samia families generally. In this regard, student essays repeatedly emphasized traditional male authority. Indeed, a number of essays went well beyond simple assertions of sex role norms to declarations of patriarchal hegemony like the following.

- I stand to say that the powers and privileges inherent in my father are unmistakably sacrosanct . . . He is the sole maker of the home and it entirely rests upon him to defend it in economic, social, and political issues. He fences, builds granaries, disciplines us. In case of misfortune, he makes offering to the living dead . . . Mother cares for children, cooks, fetches water and firewood assisted by daughters as we sons regard this as an affront to us.
- My father is the household leader who takes care of all economic activities in the home. He gives out money where there is a need to buy foodstuffs, paraffin, or clothes. Mother is responsible for the well-being of all the family. She cooks food and maintains discipline among children and reports to father for punishment. Father is in turn responsible for their discipline.

These and many other, similar statements (Noble 1985, Noble and Nolan 1983) reflect a pervasive ideology of male dominance within the Samia family. The father is held in high esteem and wields final authority within the household. In the chain of command, discipline, and punishment, he has the last word. Moreover, male dominance is linked to work roles in that women's chores are considered an "affront" to males. Finally, the household economy is under the father's control. Although women do most of the work of foodcrop production and marketing, men control any financial gain from this labor.

In sum, despite real changes in the division of labor due to male migration, Samia gender-role ideals and ensocialization patterns still give males primary rights to animals and ultimate household authority. These social, cultural, and economic realities made it unlikely that benefits from a women-specific livestock project would in fact be limited to women. So did project actions that reinforced this social order.

GENDER ROLES AND IDEOLOGIES IN THE ORGANIZATIONAL ENVIRONMENT

As noted earlier, sponsorship of the SWDGP was a complex and confusing amalgam of seven national, international, individual, or organizational actors. This diversity of sponsors gave the SWDGP a very public image. Representatives of various countries and interests made many visits to the bomas. Given advance notice of visitors, project staff would round up women to be present and answer questions. Indeed, one boma became designated the "showcase" site. The closest to a major road, it boasted European goats that gave high milk yields, the most extensive display of village technology, and an experimental plot of fodder crops. On one occasion when the President of Kenya was expected to visit, all the fenceposts were brightly painted in the colors of the national flag. The transformation of this boma into a display site illustrates how environments

affect and even alter organizations. Here was the place to take present and potential sponsors in order to assert organizational effectiveness.

Of course, each sponsor had its own interests and hence different criteria by which to measure project effectiveness. These interests spanned new technology, crossbred goats, milk and forage production, and the roles of rural women. More to the point here, however, the organizational environment and gender ideology of the major sponsors worked to subvert the goal of income generation for women.

Male Herders

As noted earlier, a herder and a watchman were hired in salaried positions at each boma. Both were men. This was understandable in the case of the watchmen because it was considered dangerous and socially unacceptable for women to stay out overnight. The case for male herders was less clear, however. If indeed herders were required, such as at the bomas stocked with Small East African goats raised under traditional grazing and tethering patterns, then why weren't women hired? And at bomas employing zero grazing systems, why were herders needed at all? Most important, what was the rationale for hiring men on a putatively women-specific project?

The answers to these questions are complex. According to informants, the selection of hirees of either gender was in part related to the ownership of the land used for the bomas. Usually private rather than trust land (i.e., communal land administered through chiefs and subchiefs) was donated for project use. Usually, too, at least one employee at each boma was a relative of the former landowner. Of course, males own nearly all the privately held land in Samia. Still, this does not fully explain why male herders were hired on a women's project. Part of the reason for this move is that it accommodated traditional gender ideals of livestock labor wherein males, not females, do the herding. Similarly, employing males in this salaried position reproduced wage-work patterns in the larger society, where it is men who typically work for wages. Among the women interviewed on the SWDGP, for example, only 5% had ever done any wage work, and only about half had ever conducted any form of cash-based trade. In contrast, 56% of their husbands were currently engaged in wage labor.

The gender ideologies held by SWDGP developers further legitimized this division of labor on the project. The UNDP technical assistant (a male) "explained" the hiring of men as follows: "There are ten casual staff who help in herding and watching the animals during the night and such duties women cannot afford to carry out . . . Therefore, men were employed to carry out such duties in the normal way" (Okoth 1980:14). Why women cannot "afford" to carry out these duties is not made clear in this document, however. Note, too, that this male technical assistant made the final decision on what kinds of

employees were needed and on whom to hire. In sum, one of the women-specific goals of the project—income generation for women—was obscured by the presence of salaried male employees.

The Technical Sponsor

As technical sponsor of the SWDGP, the UNDP's interests centered on basic husbandry concerns such as breeding, milk production, animal disease, and herd losses. Social issues, like who contributed labor and who earned salaries, received attention only when problems in these areas spilled over into production. The UNDP did seem to perceive the SWDGP as a "women in development" effort, and it considered this important insofar as women's projects were popular with international development agencies. But as summarized in its 1980 annual progress report, the UNDP saw the SWDGP's primary goals as:

> . . . developing and improving small ruminants which have been forgotten for so many years. The aim of the project was not to compete with dairy cattle . . . but only to fulfill the gaps which have been left vacant by dairy cows in the area, such as shortages of meat and milk which are sources of protein (Okoth 1980:1).

Visibly missing from this description is any mention of the goal of economic development for rural women.

With regard to the UNDP's mandate to train participants in goat husbandry, the same report claims that "The women came for practicals [training in drenching, dipping for ticks, spraying, hoof trimming, milking, etc.] once a week. This is because they have some other duties to be done at home so they could not come throughout the week like any other permanent employees" (Okoth 1980:14). Throughout the nine months of the author's field research, however, there was no evidence of regular (much less weekly) "practicals." On only one occasion were women informed in advance of a training session, and they did not show up at the stipulated time, likely because the session was scheduled during the morning hours when they work in the fields.

In any case, it would have been physically impossible for the one UNDP technical assistant to train women weekly at the eight, geographically dispersed locales. Consequently, the men in salaried SWDGP positions at each boma were instead trained and made responsible for in turn instructing the women—although they never did. However, their putative training function perhaps helps explain the presence of "herders" in bomas where there was no herding to be done. In effect, these men, who received the actual training, became the de facto managers of the "women's" goat project.

ıe *Ideological Sponsor*

Dr. Julia Ojiambo, a member of the Kenyan parliament, was the ideological ɔnsor of the SWDGP. As one of Kenya's leading spokespersons for rural men, Ojiambo enjoys both national and international acclaim for her champning of health, crafting, marketing, literacy, agricultural, and rural women's ɔgrams in Samia (Binge 1979:1). She was the major actor in planning the ɔject, obtaining initial funding, negotiating with development agencies, and ɔbilizing women's labor for the project. In fact, Ojiambo's sponsorship of the VDGP was one of the primary reasons behind many participants' decision join the project (Table 9.2). The women's allegiance to Ojiambo and their ief in her sincere commitment to development likewise contributed to their ıtinued participation despite slow progress on the SWDGP and confusion ɔut its ultimate goals. As interviewees noted:

- Dr. Julia has brought *maendeleo* [KiSwahili for 'development' or 'progress'] for the old women. I'll be in groups until my death. Dr. Julia has brought a gift from God.
- I joined . . . because when Dr. Julia got the seat in parliament, the women were happy. Then the women were given a seat in agriculture because we now have goats. I am very happy. The women have strength; they are above the men. A man had the seat before Dr. Julia. He never brought such a good thing to our district.
- I joined . . . because . . . Dr. Julia . . . was telling us that she was bringing goats. My strength here continues on that promise.

But does Ojiambo believe in limiting the benefits of development projects to men? While she clearly feels that women should be trained and urged to ablish income-generating projects (Huston 1979), she rejects the idea that men may have development needs or concerns of their own, apart from ɔn's. In an article in the *Daily Nation*, she is quoted as saying:

> I wonder who these women are that are up in arms against Kenyan men . . . Every community has got a few disgruntled women, and Kenyan women must not abuse their genuine participation in national affairs . . . I feel there should be no forum for women alone, just as there should be no forum for men alone. Any forums for women's discussions should be aimed at discussing family problems. There should be nothing like women's issues. Such issues affect the whole society and they are family issues touching man and child (Munyakho 1980:18).

Clearly, Ojiambo sees the advancement of women and their heightened rticipation in the development process as intimately related to increased portunities for families rather than for individual women. Her vision of the VDGP's future was that eventually the bomas would become major subloca-

TABLE 9.2 INTERVIEWEE REASONS FOR JOINING SWDGP

REASON CITED	PERCENT RESPONSES (n=71)[a]
Maendeleo, political allegiance	45
Obtain goats for household	25
Learn from others, exchange ideas	37
Curiosity, be with others	37
Social security of belonging to a group	14

[a]Multiple responses allowed.

tion centers where—aside from the goat and village technology projects—meetings would be held, markets built, and social events mounted. All these activities would involve both men and women. She felt that if men spent more time at the bomas, they would lend their wives more support in their development efforts and that men, too, would thus have more opportunity to participate (Ojiambo 1981). For her, having salaried male employees at the bomas was nonproblematic. Instead, this conformed to her views on the inseparability of men's and women's best interests.

In summary, the SWDGP's complex organizational environment negatively impacted its women-specific goals. The sheer number of sponsors and their disparate interests diverted attention from what one high-ranking Kenyan official termed "the strange [i.e., supposedly female] management of the project" and the aim of income generation for women. Moreover, the project's ideological sponsor did not support the concept of targeting benefits to women. Neither did the technical sponsor, who was charged with training women so they could eventually manage the goats autonomously. Instead, men were hired and trained; and this decision went unquestioned by those who planned the SWDPG as a women-specific project. Not surprisingly, participants began to experience numerous misgivings about "their" project.

DISCUSSION AND ANALYSIS

Aside from their political allegiance to Ojiambo, women enunciated two broad reasons for joining the SWDGP (Table 9.2). One, of course, was the hope of economic gains from eventual goat ownership (cited by 25% of interviewees). The other consisted of a variety of perceived social and/or educational benefits (Table 9.2). Some of the social benefits presumably were realized. But are they enough to qualify the project as a success? Certainly, from the UNDP's point of view, the project was counted a technical success. It lost very few animals and showed a financial gain from milk sales. And although

crossbreeding was in an early stage, relatively few problems had been countered.

But what about the proposed economic benefits to women? Recalling Dixon's of conditions justifying women-specific projects, it is clear that at least three these hold for Samia. First, women represent a high percentage of *de facto* usehold heads. Second, men are likely to reap the returns to women's labor. ıird, women who head households engaging in small ruminant production arly could benefit from assistance to increase their productivity and the returns their labor. Any or all of these conditions might have paved the way for a ccessful women-specific project. Yet across the two-plus years of its existence cumented here, the SWDGP never produced any clear economic benefits participants. Worse still, a majority of interviewees (54%) reported that it terfered with other tasks, including housework (34%), cropping (10%), and ıding (10%). The only individuals who directly benefited economically were e male employees. Their labor was attached to a wage, not a promise. Women d not even acquire any new skills or knowledge, thanks to the technical ıonsor's rationalization of the need to accomplish work "in the normal way." nly men received training in dairy-goat management, training that was iginally promised to women.

Neither were the benefits promised to families forthcoming. The household istribution scheme was indefinitely delayed by the project's decision to move ossbred offspring to other bomas. In any case, the scheme would have meant ıore work for women at home—work that likely would not have directly enefited them. Placing goats in a family context where males dominate livestock ecisionmaking and hold final authority over the household economy would ffectively block women's control of the animals. Recall that the household istribution scheme came into being in large part to assure husbands that they ould eventually profit from their wives' participation in the project. A goat for very household really meant a goat for every husband.

Here lies the core of the SWDGP's problems. From the outset the goat ıroject was *not* entirely a women-specific effort. Rather, it had two, competing goals: improved health and nutrition for ***families*** and income generation for *women*. The former was considered at least as important as the latter.

Organizational ideologies and practices further obscured the goal of income eneration for women. The SWDGP's ideological sponsor emphatically believed n the inseparability of men's, women's, and families' best interests. Her notion of women's income translated to family income. Here, the contextual meaning of "family" is important. Kenyatta's description of Kenyan patriarchal families holds for Samia as well as for the nation as a whole.

> The father is the supreme ruler of the homestead. He is the owner of practically everything, or in other words, he is the custodian of the family property. He is respected and obeyed by all the members of his family group (Kenyatta 1938:9).

In such contexts, a family-oriented project would not necessarily benefit women. More likely, men would control any benefits at the household level, where men have "supreme" authority over labor and its returns, even when women act as *de facto* heads.

As we have seen, the ideological sponsor was also concerned about threats to male authority. As Staudt (1985) has documented, this concern is shared by many USAID bureaucrats. Yet worries about the intrusion of women-specific projects into the private family sphere may be inappropriate for many developing nations where women have larger public roles. At first glance, this would seem to be the case in Kenya. Approximately 88% of the female population resides in rural areas, where almost all adult women farm their own smallholdings and produce much of their families' food. In nearly a fourth of all rural households, the husband is either deceased or absent for long periods (Central Bureau of Statistics 1977), leading females to assume much of the work normally done by men. Still, the concept of "public" is problematic. While certainly rural Kenyan women engage in many non-domestic activities (e.g., hoeing, weeding, harvesting, storing and processing grains, poultry raising), they nevertheless live in households where they have virtually no control over returns to their labor, even when acting as *de facto* heads. Moreover, Samia women rarely participate in trade or wage work.

All these factors contributed to the difficulty of limiting SWDGP benefits to women. Ultimately, participants' ownership and management of the project was mediated both by the existing gender order in Western Kenya and by the ideologies and practices of project organizers and agencies. These factors all worked to effectively counter the threat of redistribution within the family sphere. The conditions that some authors argue legitimize the circumscription of benefits to women were never mitigated.

CONCLUSIONS AND POLICY IMPLICATIONS

A central problem of the SWDGP was its mix of family and women-specific goals. This is illustrative of a common belief among experts and bureaucrats from developed and developing nations alike that these two populations—families and women—are inseparable. Hence the argument for integrated projects. But counter-arguments for women-specific initiatives indicate that there is good reason to distinguish these groups. Recall that the overarching criticism leading to the Percy Amendment and creation of the WID office in USAID was that, with development, women lose and men gain. In the past, agricultural development efforts have ignored women—the "invisible farmers"—and their vital economic roles in cropping and stockraising. As a result, on orthodox "integrated" projects, men have gained new knowledge, status, and real economic benefits, while women have reaped only added work. Thus the need for women-specific projects.

To date, however, such projects have been plagued by problems. Underfunded, small, isolated, and vouchsafed little importance, they have often devolved into welfare action directed at women as wives and mothers, not as productive agricultural or pastoral workers. One reason women-specific projects suffer such problems is that they represent the most radical course in gender redistribution planning. They openly challenge idealized family concepts of males as providers and females as dependents. This has led some analysts to conclude that "Gender issues have more mileage when submerged in development sectors such as water, forestry and agriculture" (Staudt 1985:107). I add dairy goats to this list.

Analysis of the SWDGP throws into relief the drawbacks of *both* integrated and women-specific projects. The SWDGP's family objectives are characteristic of the former. Had the family boma plan been realized, it would have meant more work for women in a household context where men dominate livestock decisionmaking. As for the women-specific objective, this was characteristically stymied by project sponsors' adherence to indigenous gender roles and stratification patterns, and by gender ideologies that shape planning and policy at international as well as national and local levels. In truth, none of the sponsors viewed the SWDGP as a women-specific project.

The displacement of the SWDGP's women-specific objectives by "family" goals does not mean that all such endeavors are necessarily destined to fail. However, it does point up some important lessons. One is that gender ideologies are profoundly entrenched and that the notion of limiting benefits to women is a very controversial one. Women-specific projects are probably far more radical than policymakers realize. Planning and implementing such initiatives is correspondingly problematic. The larger lesson is that a great deal remains to be learned about how to incorporate a "conscious concern for women" into agricultural development programs and policies. If the SWDGP is representative of projects specifically designed to aid women economically, what can we anticipate from projects in which women are *not* explicitly considered? According to Tinker (1981), the answer is: a reversion to earlier patterns of ignoring women altogether.

Despite the many shortcomings of women-specific projects, the rationale behind them cannot be dismissed. Opting for orthodox integrated projects only reinforces ideologies and family structures that promote inequality between men and women. I suggest that women-specific projects can offer much-needed insights into how to build a workable "conscious concern" for women into development. However, such projects must be adequately funded and their progress carefully monitored and studied. Certainly, going from invisible to visible is not easy, and there is much for all of us—women, men, and bureaucrats, anyway—to learn along the way.

NOTES

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2. Some innovations (e.g., improved water supplies, health care, roads) doubtless made life easier for all, although still perhaps differentially for males and females.

3. For details on informant populations and data collection procedures, see Noble 1985 or Noble and Nolan 1983.

4. Thirty-seven percent were members of associations that farmed for money; another 40% belonged to workgroups that typically consisted of clan members who exchanged agricultural labor. Other memberships included: church farming groups that produce food to give to landless poor families (14%); church clubs that aid women in times of illness or birth (13%); fishing and village technology development groups (10% each); brewer associations (21%); and dancing (3%), family planning (1%), and beekeeping groups (1%).

5. Milking was less clear-cut. A few students mentioned that their mothers do the milking; one noted that his mother sells some of the milk and keeps the revenue. However, a much larger number attributed milking and milk sales to males.

6. The essays' emphasis on traditional roles may be partly due to the students' stage of psychological development. In the U.S. and Europe, children of this same age group are more concerned with conformity to sex role norms than is the larger population (Maccoby and Jacklin 1974). Similarly, a 1984 study in Kenya found that essays by secondary school children were useful sources of information on sex role expectations in that "Secondary school children are often the repositories of their societies' highest aspirations and values, as yet undimmed by reality" (Buzzard 1984:276). The truth probably lies somewhere in between the women's responses and the traditional values enunciated by the students.

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Appropriate animal health information systems for nomadic and transhumant livestock *populations in Africa*

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Summary: Nomadic and transhumant livestock comprise the normative mode of production in the arid and semi-arid regions of Africa. By adopting management practices with high human labor and informational input, pastoral societies have adapted to innately high environmental variability. The Western veterinary model, which developed under sedentary conditions of production, has been unable to address herd health problems in African pastoral regions. By soliciting the participation of pastoral people, however, it is possible to develop an animal health information system that is technically appropriate, economically viable and socially acceptable. The organizational structure of appropriate information systems can furnish the framework for animal health delivery under pastoral conditions.

KEYWORDS: Africa - Animal health delivery - Appropriate technology - Ethnoveterinary research - Information system - Nomadic - Pastoral - Rangeland - Transhumant - Veterinary anthropology - Veterinary auxiliary.

INTRODUCTION

The delivery of animal health services to nomadic and transhumant livestock populations in Africa has never been easy. Most of the difficulties can be traced to attempts to transfer an inappropriate Western veterinary model. Because "establishment" veterinary medicine in Africa has been imported largely from Europe and North America, it lacks mechanisms to function under nomadic and transhumant conditions.

There is no question that Western veterinary medicine works in the West: it improves the well-being of animals to the benefit of society-at-large and stands the test of many free-market economies. In recent years, the Western model has adapted to great social and economic change and responds to many autochthonous, animal-related concerns. However, no one should expect it to be capable of responding to livestock health problems under the unique conditions of nomadic and transhumant life.

After having worked with a number of pastoral societies, the authors conclude that the problem of appropriateness is central to the development of veterinary

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medicine in Africa. Western veterinarians working in Africa have often taken the view that nomadic management is unproductive and esoteric. In fact, it is at least as productive as Western ranching (9); unless it is better understood, little progress can be made on pastoral animal health delivery. The Western veterinary model is just too idiosyncratic to apply to African pastoral conditions.

The notion of appropriate technology is embedded in development jargon, where it usually refers to simple, small-scale, labor-intensive alternatives. While these attributes may be important, they are not the only factors that influence the success of veterinary medicine under African pastoral conditions. Getting the technology right is only part of the solution; making it compatible with cultural, economic, social and physical conditions is also necessary.

Animal health information systems can play an important role in the development of a veterinary model for African pastoral livestock populations. While the information systems themselves need to be compatible with African pastoral conditions, the information which they collect and process must also be appropriate; that is, useful to the future development of veterinary medicine.

This paper is based on a composite of the work undertaken by the Section of International Veterinary Medicine of Tufts School of Veterinary Medicine in the West African Sahel, the Horn of Africa, East Africa, and southern Africa. These regions are parts of the arid and semi-arid pastoral zone of sub-Saharan Africa that stretches in a continuous, curving band through Mauritania, to Somalia, Tanzania and Botswana. Because differences between countries and societies can be vast, the authors emphasize results that are appropriate to all or most pastoral situations. This is done with the hope that development work on other nomadic and transhumant livestock populations can progress without "re-inventing the wheel".

WHAT ARE NOMADIC AND TRANSHUMANT LIVESTOCK?

This is a frequent topic of debate in academic circles. Pastoral is another word that refers to grazing animals raised under extensive conditions by traditional societies. The nouns "nomad" and "pastoralist" both refer to people who take animals out to graze on pasture. (Nomad derives from the Greek *nomos*, which means "pasture", while pastoralist derives from the Latin *pastor*, a shepherd.) For our purposes in Africa, the nouns, pastoralist and nomad, as well as their adjectival forms, pastoral and nomadic, are interchangeable.

Mobility in the pursuit of pasture is a rational management strategy in highly variable ecosystems. It is a fundamental attribute, although not explicitly denoted by the words "pastoral" and "nomadic". Recent evidence shows that animal protein production per hectare from nomadic ecosystems equals or exceeds that from ranches (9). And in East Africa, nomadic production has been sustained for at least 2,000 years. This invalidates the romantic notion of unproductive nomads wandering aimlessly through the grasslands. (For an essay on nomadism in a historical context, see ref. 2.)

Transhumant is a loan word from a French construction (*transhumance*) used in social science writing. Transhumant derives from the Latin *trans* meaning "across"

and *humus* meaning "earth". Literally speaking, it means "moving across the earth"; therefore, transhumant livestock populations are explicitly mobile. In conventional usage, transhumant also implies that the grazing migration has a seasonal pattern. In other words, herd migration may be limited to the summer or to a particular rainy season or other favorable grazing period. After the seasonal migration, the people and their animals return to a fixed location.

Many adjectives can modify the above definitions: sedentary and semi-sedentary, agropastoral, mixed and pure pastoral, and others. Most of these attribute a crop farming component to the productive enterprise. Sometimes a distinction is also made between nomadic pastoralism – which is seemingly a redundant term for African purposes – and transhumant pastoralism.

We prefer these definitions:

– in contrast to ranch populations, nomadic livestock are those which are grazed or browsed on natural vegetation using human labor and information-intensive management;

– transhumant livestock are a subset of nomadic populations that are seasonally grazed away from an identifiable "homesite".

Because pastoral management does not rely on fossil fuel consumption, nomadic and transhumant livestock can be considered forms of pre-industrial animal agriculture. This label is much more meaningful than the culturally biased concept of "primitive".

The practical value of a detailed classification of pastoral societies is questionable. The categoric definitions are fluid and lack consensus, and there are few rigorous demographic and economic data on most pastoral societies. Also, societies change over time, and not necessarily in any particular direction. For the epidemiologist working under pastoral conditions, classification is much less important than understanding the nature and role of mobility and other herd management techniques in the specific society.

Pastoral people and the societies to which they belong, their animals, and the land and its flora and fauna, are often described in a holistic context as a "system". Two examples are the Wodaabe system of the West African Sahel and the Masai system of the East African plains. While this is a useful concept that correctly implies a complex ecology, the authors have avoided pastoral systems labels in order to circumvent confusion with the term "animal health information system". Instead, reference is made to a "society", meaning a self-recognized group of people with many internal affinities, including language, culture, kinship, social relations and economy.

OBJECTIVES OF AN ANIMAL HEALTH INFORMATION SYSTEM: THE CASE OF TRYPANOSOMIASIS

Even looking beyond Africa, on a worldwide basis, animal health information from pastoral livestock is severely lacking. There are few technical papers on diseases and their patterns of occurrence in nomadic and transhumant herds. For example,

of the thousands of papers on African trypanosomiasis, there are very few that specifically define the extant conditions of pastoral management.

At least since colonial times, there has been a "shadow knowledge" that pastoralists modulate herd movement in tsetse-infested areas in order to reduce the prevalence of trypanosomiasis. However, the textbook paradigm is that tsetse exclude all but a few, mostly trypanotolerant, cattle from much of para-equatorial Africa (1). Little regard has been given to the inferior nutrition of treed savanna compared to grasslands, or the opportunity cost of animal *vis-à-vis* crop agriculture in wet ecosystems, or that pastoralists rather than cattle may be the scarce commodity. The geographic exclusivity of cattle and tsetse may be true, but the singularity of the trypanosomal cause is tenuous.

Given that tens of millions of dollars are spent annually on trypanosomiasis research (carried out mostly in the laboratory), and that often the intent of government policy is the suppression of pastoralism, it would seem of critical importance to quantify trypanosomiasis as a constraint under different regimes of pastoral management. As far as the authors know, this has never been attempted.

The first objective, then, of an appropriate animal health information system is **to monitor the information necessary for rational pastoral development strategy**. Such information includes animal disease status, health management factors, the use of animal health products and the activities of animal health workers.

The transhumant Fulbé of Burkina Faso recognize a number of diseases of cattle (14, 18). One is "wilseré", a word that embraces a variety of syndromes and includes trypanosomiasis as well as other pathologic entities. The Fulbé conceptualization of "wilseré" seems to derive from a process of elimination: diseases that can be diagnosed by their patterns of occurrence and vital and post-mortem signs and lesions are excluded. Some examples of excluded diseases are streptothricosis ("gugna"), rinderpest ("caara") and blackquarter ("baleeyel"). Trypanosomiasis and other diseases are retained in the "wilseré" category because their non-specific or protean manifestations make them difficult to diagnose (11, 18).

This type of highly inclusive disease complex may be a common phenomenon in pastoral cultures. It makes an appearance also among the Kel Dinnik Twareg of Niger, who think that a multifaceted syndrome called "azani" is at the root of all camel diseases (19). In spite of an outstanding ability to describe many cattle and small stock diseases that correspond to Western nomenclature, the Twareg are quagmired in an all-embracing camel disease complex.

Therefore, a second objective for a pastoral animal health information system is **to clarify culturally-bound disease complexes, both for the pastoralists and for personnel involved in animal health care delivery.**

Trypanocidal drugs are widely but erratically distributed in the savanna regions of sub-Saharan Africa, and the demand of pastoralists for these drugs is strong. Trypanocides are not, however, used in a systematic way that would optimize their effectiveness. Moreover, *ad hoc* usage might enhance the development of drug resistant strains, which are common. "Wilseré" further complicates the picture by being understood by the dispensing animal health technicians (who are not Fulbé pastoralists) as trypanosomiasis only. The result is misuse and overuse; there is no knowledge of the economic benefit, if there is any, except that occasionally a clinically ill animal will be saved.

This illustrates the third objective: **to determine the technical and economic feasibility of addressing specific diseases** through epidemiological investigation, therapeutic or preventive field trials and cost-benefit analysis.

One of the newer methods of tsetse control is the placement of insecticide-treated cloth "screens" at strategic locations in pastoral habitats. To their peril, the flies are attracted to the blue color of the cloth. The devices can be highly effective for fly control but are not effective enough to achieve eradication. (There is ongoing testing of chemical attractants that would enhance their effectiveness.)

Screens were first tested in the early 1980s by an expatriate team in West Africa, with the idea that government animal health technicians would ultimately provide an anti-tsetse service. Later, in Kenya, staff at the International Centre for Insect Physiology and Ecology realized that pastoralists might be in the best position to monitor tsetse populations and place the traps. Accordingly, field trials were carried out with the participation of pastoralists.

The results of these trials are unknown to the authors, but the experience begs several questions. Even if the screens were effective at reducing losses, would the pastoralists think the extra labor worthwhile? Would a potentially dangerous insecticide be misused? And how much technical support (extension) from outside personnel would be required to introduce the activity and sustain it? These questions illustrate the fourth and fifth objectives of nomadic and transhumant livestock health information systems: **to test the social acceptability of animal health interventions** and **to give pastoralists an opportunity to participate in their own development.**

In the case of acute, epizootic diseases, an animal health information system might also provide red flag signals of outbreaks that require special assistance. However, the authors have not been impressed by the ability of any animal health information system – appropriate or not – to fulfil this objective under African pastoral conditions.

DEFINING APPROPRIATENESS THROUGH VETERINARY ANTHROPOLOGY

Although scientific inquiry has only recently influenced indigenous thought, and that but slightly, it is now generally accepted that pastoral societies have detailed knowledge, gained through experience, of animal health and production. Natural explanations, rather than supernatural or religious ones, are given for most disease processes. Even though indigenous knowledge may often seem unrigorous or misinformed, it is extensive, and the most satisfactory plan for developing an appropriate animal health information system is to elucidate this knowledge and build on it.

Veterinary anthropology, also known as ethnoveterinary research, is an interdisciplinary domain that seeks to obtain animal health information from pastoralists (6, 7, 8, 13, 14). The research is best carried out as a collaboration between veterinary epidemiologists and social scientists, and may require the assistance of an ecologist or geographer. Because of the complexity of pastoral management strategies and the high biotic variability of arid and semi-arid ecosystems, ethnoveterinary

researchers must become familiar with the pastoral societies they study, pastoral modes of production and the physical environments. Animal health data will be difficult to interpret without this understanding.

From the personnel standpoint, interdisciplinary work is expensive. Two or three researchers may be required to match the data output of a single disciplinary worker. However, it is possible for one person with extensive experience of nomadic and transhumant livestock to accomplish the task alone. An astute researcher who lacks sufficient practice can often obtain satisfactory results if he or she is supervised by someone with extensive pastoral experience.

The methods of information collection include sample surveys with questionnaires, open-ended interviews and participation in daily life. The authors have found that a combination of all three methods gives the best results. This is especially true in the early phases of research when it is desirable to obtain a holistic overview.

The sample frame is defined by ethnic group and geographic location. There may be two or more ethnic groups within one region and each may have different normative herd profiles, management techniques, economies and animal disease patterns. An interpreter is usually necessary but introduces additional risks of misunderstanding. The authors have found that it is best to have an experienced interpreter from the same ethnic group as the pastoralists, but this is not always possible. Cross-cultural problems are, of course, fewer if the researcher knows the interpreter well.

In an effort to obtain an abundance of data quickly, the impatient researcher may place too much reliance on questionnaires administered by hired surveyors. Eventually, the use of questionnaires may be appropriate to collect data for an animal health information system but, without the overview, data collected this way may be misinterpreted. For example, culturally-bound disease complexes such as "wilseré" may be mistaken for single disease entities.

It is also a mistake to make the interview session too brief. While there is no need for the researcher to integrate into the society or household in an anthropological sense, it is still necessary to build confidence through discourse. Time is also needed to observe and comprehend patterns of behavior. One to three days may be required at each nomadic camp or transhumant site, with several hours devoted to interviews each day.

An attempt should be made to define a normative herd in terms of numbers of each livestock species. Contrary to common opinion, an estimation of animal numbers can often be obtained simply by asking; visual verification, however, should be attempted. One should also be aware of the possibility of animals grazed or watered away from the camp. If animals are sent away only for the day or overnight, they should be included in the census.

why? → • Unless the relationship between ownership pattern and herd productivity is under investigation, animal ownership is ignored. First, if the herd is split for a season, the unobserved animals are considered to be of a separate herd. Second, so long as they are in the herd together, no distinction is made between animals that are owned, borrowed or consigned.

Many pastoral regions contain some atypically large herds owned by wealthy individuals. Whether these form part of the sample is less important than knowing they exist. Sometimes large herds are excluded on ideological grounds, when the

- but abandons important relationships - questions.

researcher believes that, in the midst of poverty, the wealthy should care for themselves. At other times large herds may be included for convenience, because many animals can be studied at one place. The authors have found, however, that the best information does not come from herders who are hired to care for large herds because management in such cases usually entails less observation of each animal.

There must be considerable awareness of seasonal variations. Data can be sorted into seasonal climatic categories, such as the early, mid- and late rainy and dry seasons, the short rains and the long rains, the hot and cold seasons, and so forth. Seasonal categories can also be developed by analyzing ambient temperature patterns or incremental rainfall (12). Also, pastoralists usually have their own seasonal categories into which data can be sorted. A dogmatic assignment of dates to each season should, however, be avoided, since interannual variations will affect the ecology and the timing of herd management activities.

Laboratory confirmation of field data is unimportant when starting ethnoveterinary studies; on a population basis, the results are meaningless until there is confidence that the sample is representative. Also, laboratory confirmation usually increases the logistical complexity of the work and adds another factor of uncertainty. Laboratory diagnostic tests and surveillance methods become more valuable after an animal health information system is established.

When the goal is to develop a continuously functioning animal health information system as an integral part of health delivery, the veterinary anthropological studies should be given an open-ended time commitment. Evolving the ethnoveterinary research into the information system itself will give the pastoralists the greatest opportunity to participate.

ESTABLISHING THE GEOGRAPHIC FRAMEWORK

Although information on ethnicity and seasonality is easily obtained, the geographic boundaries of the sample frame are problematic; except for such political divisions as district or province, geographic boundaries usually have been ignored.

However, when all three defining characteristics are known, it is possible to make concise, useful statements on pastoral animal health. For example: vitamin A deficiency is a major cattle production constraint for the Wodaabe of the pastoral habitat of central Niger (16). This statement can be quantified with prevalence data for nyctalopia during the late dry season, in May, combined with production-loss estimates obtained from the Wodaabe at the end of the early rainy season, in mid-July. Benefit:cost analysis for preventive intervention (over 100:1 when vitamin A powder is administered by the Wodaabe themselves) is then possible.

The authors have attempted geographic definition in two very different pastoral ecosystems. Earth surface features, vegetation and land-use patterns were considered in both cases. In spite of the importance attached to geographic boundaries, only a brief description of each experience is possible here.

In Burkina Faso, indigenous animal health information was systematically collected in a tsetse-endemic area over a seven-month period (14, 18). The pastoralists were

transhumant Fulbé who reared cattle and hired farm laborers from another ethnic group to cultivate small plots of millet. They moved seasonally up to 25 km, from small villages near their farms to the banks of the Nouao tributary of the White Volta River. Since Nouao received relatively high rainfall for a pastoral environment (800 mm), it was assumed that systemic variability (for example, of rainfall and biomass) would be relatively low.

The sample was determined in collaboration with a social geographer. It was reduced by 50% by restricting the study to only one bank of the river, and was further reduced to 15% of 250 Fulbé households that were located in a line of villages situated perpendicular to the river. This was done to account for variability related to proximity to the river. The sample represented 375 sq km (or 750 sq km, if both banks were included) of riverine and tallgrass savanna. The 750 sq km represented 38% of the area of a development project, but no attempt was made to make the sample conform to this, as the influence of the river would have been obscured.

The second example came from the northern Sahelian grassland of the Republic of Niger (12, 17), a region of low mean annual rainfall (280 mm) and high systemic variability. Two ethnic groups, the transhumant Kel Dinnik (Twareg) and the nomadic Wodaabe (Fulani), comprised over 90% of the pastoral population, with the Twareg predominating.

"Ground-truthed" biomass measurements were combined with systematic aerial reconnaissance and satellite data (NOAA, AVHRR and Landsat) to define the geographic limits of dry season pasture. This was a major research effort that required the collaboration of epidemiologists, ecologists and physical geographers over a seven-year period. A rainfall model for drought early warning was developed from data on human and animal populations, biomass, carrying capacity and rainfall.

The geographic limits for the model are shown in Fig. 1. They formed the boundaries of a pastoral habitat that contained most of the biomass on which the pastoral livestock of the region were sustained. By defining a zone of uniform ecological conditions and monitoring the herds of 30 to 40 nuclear families, it became possible to obtain implications on animal disease and treatment interventions for a large geographic area.

The Niger experience demonstrates the value of an epidemiological component to integrated pastoral development, where it has too often been overlooked. Future research should aim to simplify this approach in order to extend it to other animal health projects. By eliminating trial and error and substituting systematic aerial reconnaissance with a single census, in two to four years it should be possible to obtain valid results less expensively.

Once geographic boundaries are defined, people need to be organized to move information in and out of the field in ways that are sustainable and have a measurable economic impact.

MAKING THE SYSTEM OPERATIONAL

While the ecological research was in progress in Niger, an animal health information system called "Vetscout" was under development (15). Vetscout collected

data from six grazing areas in the pastoral habitat and three in the rainy season grazing zone. Data were collected separately for each species of livestock: camels, cattle, sheep, goats and donkeys.

Field implementation of Vetscout was carried out by Twareg and Wodaabe pastoralists who had returned to herding after a ten-day training session for veterinary auxiliaries (VAs, barefoot vets, veterinary scouts, et al.) (3, 10, 15). Without going into detail, it should be noted that this short period was a deliberate attempt to avoid potential conflicts due to prolonged absence from kinfolk and herding responsibilities. Several years of social science research had been undertaken before

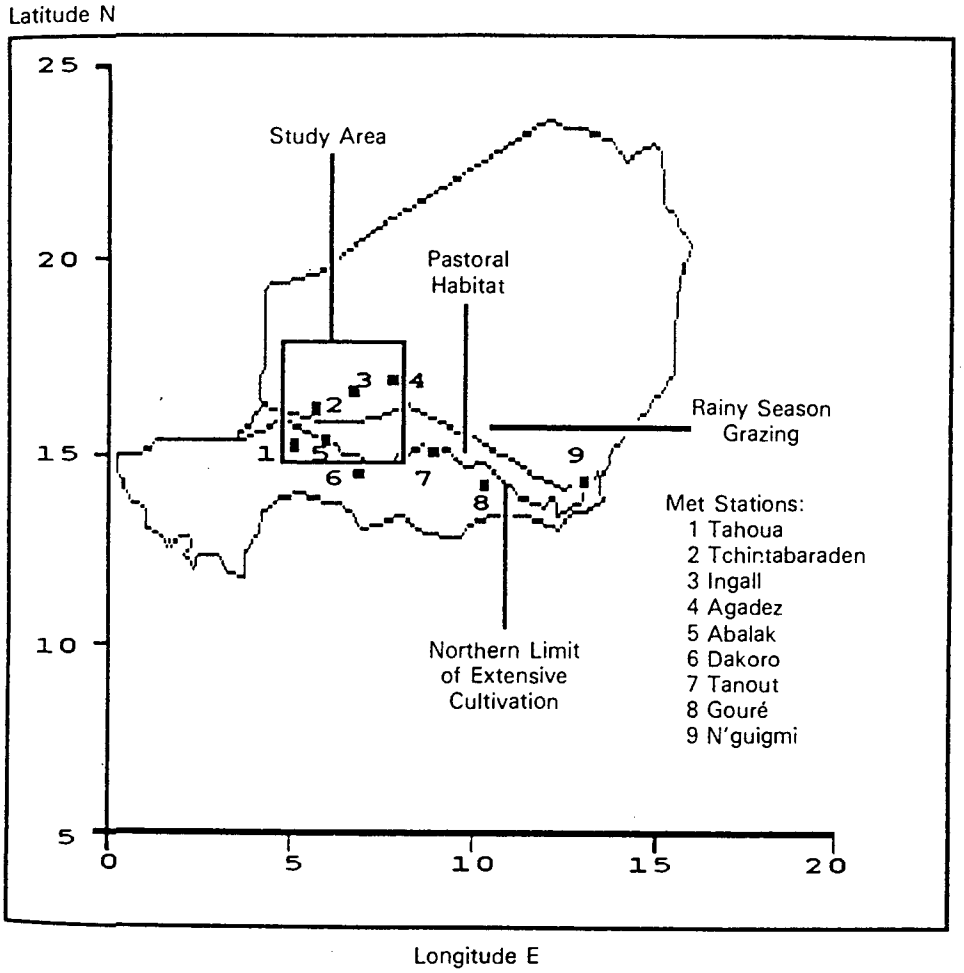

FIG. 1

Map of Niger with locations of the study area, meteorological stations and boundaries of the pastoral habitat

this decision was reached (4). The short period was also intended to avoid any expectations of a salaried government position at the end of the training. The Vetscouts operated as private agents and were expected to charge for their animal health care services.

Vetscout had the dual role of collecting treatment data (in other words, *of monitoring the scale of their activities) and of indicating disease occurrence* by the number of cases treated. While Vetscout did not exactly give disease incidence rates, it did provide a good indication of relative frequencies and seasonality. Eight disease categories were recognized: respiratory illness, diarrhoea, internal parasites, external parasites, conjunctivitis, wounds, rinderpest and "others". Although ethnoveterinary studies had been undertaken, and the complexities of Twareg and Wodaabe veterinary concepts were known (5, 19), the authors chose to initiate the information system with this simple disease classification.

Record-keeping was done on specially designed forms with pictograms to illustrate each treatment. Two examples are shown in Fig. 2. Each time a syndrome was encountered and treated, the Vetscout would place a slash in the appropriate box. Reporting forms were collected monthly and collated at a centrally located government livestock service facility. Data were entered into a computerised database that produced monthly reports and special reports for any specified time period. One trained government employee supported the system for 55 Vetscouts who were spread over an area of about 50,000 sq km (17). The sample they covered was only a small fraction of the total area.

Vetscout fulfilled the objectives discussed above for an animal health information system. For the government, it proved to be a cost-effective method for animal disease surveillance because all field recording was done by Vetscouts. Vetscout was also an

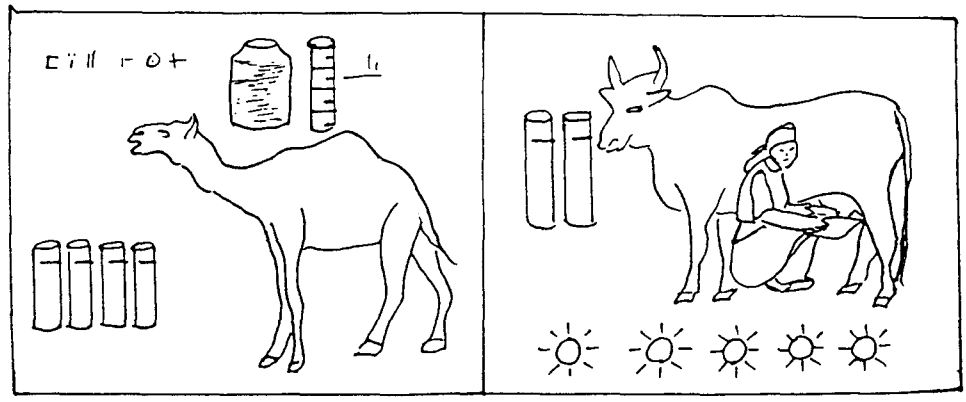

FIG. 2

Pictograms communicating disease and treatment and allowing the tabulation of cases seen by veterinary auxiliaries – writing in left box is Tifinagh, a script used by the Twareg

important stock inventory tool that gave greater precision to the procurement and distribution requirements for animal health commodities.

A post-project evaluation of Vetscout indicated that a majority of the Vetscouts continued to operate without supervision so long as they could obtain animal health commodities to sell in the field. This can be a problem because all commodities are imported and neither the government nor private sector sources has routine procurement mechanisms.

The greatest problem for the future collection of animal health information will be to institutionalize the flow of completed report forms to the central analysis unit. The experience of the authors indicates that this would be accomplished most easily through regional markets and veterinary posts, where the government livestock service is already installed.

CONCLUSION

Appropriate animal health information systems for nomadic and transhumant livestock populations probably cannot be sustained at a local level only. Pastoral people are generally aware of the disease processes that affect local animal populations and they keep themselves informed by word-of-mouth communication. Therefore, even though an economically efficient information system could be developed, it would not offer much of an advantage or incentive to continue at the local level.

On the other hand, a large government-operated system is hardly sustainable. Regardless of how budgetary priorities for animal health are determined, experience indicates that, for political reasons if nothing else, animal health activities always receive lower priority than "basic needs". Also, given the current international emphasis on economic restructuring and the reduction of recurrent costs in African countries, an animal health information system would collapse if it remained dependent on public sector operation and financing.

The crux is to find a way to make large animal health programs sustainable by building on multiple local initiatives, while rewarding local participation by improving the productivity of pastoral herds. The objectives and activities described in this paper were developed with this strategy in mind.

It is time to rethink animal health delivery to nomadic and transhumant livestock populations on which, except for the control of a few viral diseases, veterinary medicine has had little impact. In the future, appropriate large-scale information systems with grass-roots participation may be the avenue to better veterinary service for pastoral societies.

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SYSTÈMES D'INFORMATIONS ZOO-SANITAIRES ADAPTÉS AU NOMADISME ET À LA TRANSHUMANCE EN AFRIQUE. – A.E. Sollod et C. Stem.

Résumé: Le nomadisme et la transhumance constituent le mode d'élevage traditionnel des régions arides et semi-arides d'Afrique. En adoptant des pratiques qui impliquent une somme de travail considérable et nécessitent de nombreuses informations, les sociétés pastorales se sont adaptées à la forte variabilité de l'environnement. Le modèle vétérinaire occidental, qui s'est développé dans des conditions de production sédentaires, n'a pas pu répondre aux problèmes sanitaires du cheptel des régions pastorales africaines. Si l'on obtient le concours des populations pastorales, il est cependant possible de développer un système d'informations zoo-sanitaires techniquement adapté, économiquement viable et socialement acceptable. La structure des systèmes d'informations adaptés peut fournir un cadre à l'organisation de la santé animale dans l'élevage pastoral.

MOTS-CLÉS : Adéquation de la technologie - Afrique - Anthropologie vétérinaire - Auxiliaires vétérinaires - Nomadisme - Organisation de la santé animale - Pastoralisme - Pâturages - Recherches ethnovétérinaires - Système d'informations - Transhumance.

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SISTEMAS DE INFORMACIONES ZOOSANITARIAS ADAPTADOS AL NOMADISMO Y LA TRANSHUMANCIA EN ÁFRICA. – A.E. Sollod y C. Stem.

Resumen: El nomadismo y la transhumancia constituyen el modo normal de producción en las regiones áridas y semiáridas de Africa. Adoptando prácticas que suponen una cantidad de trabajo considerable y requieren numerosas informaciones, las sociedades pastorales se han adaptado a la gran variabilidad del medio ambiente. El modelo veterinario occidental, que se ha desarrollado en condiciones de producción sedentarias, no ha podido responder a los problemas sanitarios de los rebaños en las regiones pastorales africanas. No obstante, si se obtiene la cooperación de las poblaciones pastorales, resulta posible desarrollar un sistema de informaciones zoosanitarias técnicamente adecuado, económicamente viable y socialmente aceptable. La estructura de los sistemas de informaciones adaptados puede ofrecer un marco para la organización de la sanidad animal en condiciones pastorales.

PALABRAS CLAVE: Adecuación de la tecnología - Africa - Antropología veterinaria - Auxiliares veterinarios - Investigaciones etnoveterinarias - Nomadismo - Organización de la sanidad animal - Pastoralismo - Sistema de informaciones - Transhumancia.

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THE VETERINARY AND PARA-VETERINARY PROFESSIONS ACT ACT NO. 19 OF 1982

INTRODUCTION

The above Act replaces the Veterinary Act no 16 of 1933 and The Veterinary Amendment Acts of 1963, 1972, and 1974.

The Department of Agriculture was no longer prepared to administer and fund the workings of the juristic body responsible for controlling veterinarians in South Africa.

The Act had to provide for a period of transition and this was done by means of the Registrar and the Veterinary Board on a caretaker basis for a period of six months from the 1st October, 1982. Their main function was –

(a) to re-register all veterinarians in South Africa; and
(b) to organise the election, as prescribed, of a new Veterinary Council.

In a letter dated 1982/11/30, the Registrar notified all veterinarians of the coming into operation of the new Act and highlighted some important aspects, namely The S.A. Veterinary Council; The Register of Veterinarians; Continued Registration; The Maintenance of Registration; The Election of Members to the Veterinary Council; The Application of the Act to Veterinary Nurses and Change of Address.

The Registrar again communicated with all Veterinarians in a letter dated 1983/02/07 in which he informed them that the election for the S.A. Veterinary Council would take place on the 4th of March, 1983.

In both letters veterinarians were informed that any enquiries should be directed to Mr. Saayman. From the enquiries received it would appear that the whole question of registration was misunderstood, in many cases simply due to failure on the part of the veterinarian to read the documents posted to him.

The responsibility of the old administration, acting in a caretaker capacity, was by very deliberate intention engineered to expire on the 31st of March, 1983. The reason was very simply that this date was the last day of the financial year of the Department of Agriculture. It was no accident therefore that the new Act came into operation on October 1st, 1982. There was absolutely nothing that you as members or your Council (SAVA) could do about this Ministerial decision.

Details of registration follow:

Section 25(7)(b)(ii) Continued registration shall be subject to payment to the Council of an amount of R50,00 within 90 days of the commencement of this section (i.e. 82/10/01)

This payment of R50,00 was to provide for working capital for the new Council.

Section 26(i) of the Act determines that person registered in terms of section 25(i)(7)(a) may *maintain* such registration by paying annually the prescribed amount on or before the 1st April.

The current fee for maintenance of registration is –

R50,00 per annum for practising a veterinary profession
R25,00 per annum for practising a para-veterinary profession
R5,00 per annum for a student

The 90 day concession period for continued registration expired on 31st December, 1982, after which all persons who had not continued their registration, as prescribed, had to *re-register* at the following registration fees –

R75,00 for practising a veterinary profession
R50,00 for practising a para-veterinary profession
R10,00 as a student

Section 26(2) of the Act provides for exemption from payment of the whole or a portion of the prescribed maintenance fee by the Council as it may deem fit and subject to such conditions as it may in such case determine.

The S.A.V.A. has been informed that maintenance of registration over the age of 65 will be subject to an administration fee of R15,00 per annum. No other exemptions have been applied for and consequently no decisions have been taken. Your Association is, however, aware that many other categories possibly exist which deserve some form of exemption from the maintenance of registration fee – overseas membership, overseas study, pregnancy and child care leave, disabled members to name but a few. At the moment it is YOUR responsibility to apply for exemptions, but your comments in this regard will be welcomed by your Association. We do not administer the Act, but we do have our nominated representative on the Council. Send us your comments and complaints and we will brief our representative.

A paraphrase of the Act follows:

THE VETERINARY AND PARA-VETERINARY PROFESSION ACT, 1982 ACT NO. 19 OF 1982

A. Aim:

A.1 To establish and give powers and functions to a South African Veterinary Council;
A.2 To provide for the registration of persons practising veterinary professions and para-veterinary professions; and
A.3 To control such persons and unregistered persons.

B. The Philosophy:

The Act establishes the South African Veterinary Council as a body and juristic person to deliberate on its prescribed objects as follows:

B. 1 The registration of persons practising the veterinary professions;
B. 2 The regulation of the practising of such professions;
B. 3 The determination of a minimum standard of tuition and training to satisfy such registration;
B. 4 The exercise of effective control of the professional conduct of registered persons;
B. 5 The determinaton of the standards of professional conduct;
B. 6 The promotion of efficiency in and responsibility with regard to the practice of the professions;
B. 7 The protection of the interests of the professions;
B. 8 The maintenance and enhancement of the prestige, status and dignity of the professions;

B. 9 The maintenance and enhancement of the integrity of persons practicing the professions; and
B.10 Advising the Minister in relation to any matter affecting a veterinary profession or para-veterinary profession.

C. How the Act works:

The powers and functions of the Council enable it to achieve its objects as follows:
C.1 The aquisition or hiring of property;
C.2 The management (in broad terms) of such property;
C.3 The management (in broad terms) of negotiable instruments;
C.4 The spending and investment of funds;
C.5 The entering into of contracts;
C.6 Exercising or performing any power or function conferred or imposed upon it by or under this Act; and
C.7 Generally take such other steps as may be necessary to achieve the objects of the Council.

The Source of Funds is Prescribed

Proper finanical records must be kept and an audited balance sheet prepared for each financial year – This balance sheet being open to inspection at the Council's office by persons registered under this Act.

This Council must report to the Minister on its activities during the year at the end of each financial year. The viewing of such a report is prescribed.

Registers must be kept in respect of all persons whose applications for registration in terms of this Act have been approved and the qualifications for registration are prescribed.

The requirements for registration, details of registration, maintenance or alteration of registration and the termination of registration are covered in detail in the Act.

An unregistered person shall not practise veterinary or para-veterinary professions.

Any profession which has as its object the rendering of services supplementing the service deemed to pertain specially to a veterinary profession will be subject to the provision of the Act if so declared by the Minister – Para-veterinary professions.

Provision is Made for Student Registration

The Council may make rules to achieve or promote its objects or to exercise its powers or perform its functions.

The Minister may, on the recommendation of the Council, make regulations under the Act in order to attain or promote the objects of the Act.

A person registered to practise a veterinary profession may compound or dispense any medicine – provided he does not keep an open shop or pharmacy.

Arbitration in respect of fees charged for the rendering of a service is provided for and an unregistered person is specifically excluded from recovering renumeration for services rendered.

Employers may not demand that a registered person performs any work which he may not perform in terms of the rules.

In this Act a person accused of being unregistered or of having performed the act in respect of which the prosecution is instituted, for gain, is guilty until proved otherwise.

Provisions is made for Offences and Penalties

D. Administration of the Act is administered by the South African Veterinary Council a juristic body established under the Act and elected or nominated as follows:
D.1 Two officers designated by the Minister
D.1.1 a veterinarian of the Department of Agriculture.
D.1.2 an officer designated on account of his knowledge of law;
D.2 A representative of each university in the Republic which has a faculty of veterinary science – currently two;
D.3 A representative designated by the South African Veterinary Association; and
D.4 Six persons elected in the prescribed manner.

Provision is made for an association of persons representing the persons practising a para-veterinary profession to delegate a person who shall be co-opted as a member of Council whenever a matter affecting those persons is dealt with by the Council.

A member of Council holds office for a THREE year period, but may be redesignated or re-elected.

The persons who were members of the Veterinary Board (Section 1 of the Veterinary Act, no. 16 of 1933) constituted the Council for a period of six months after the commencement of the Veterinary and Para-veterinary Professions Act. no. 19 of 1982, on the 1st of October, 1982.

The qualifications of members of Council, the vacation of office and the filling of vacancies is prescribed.

A President and Vice-President are elected from their number by the newly constituted Council at its first meeting.

The President and Vice-President may not hold office for longer than two consecutive terms of office, but may vacate such office without terminating his membership of the Council.

The Council MUST meet THREE times at least each year.

Three Council members may call for a special meeting in writing and such meeting must be held within 30 days of the request.

The majority of members of the Council shall constitute a quorum for a meeting.

A decision of the Council is a decision by the majority of members present at the meeting.

The member presiding at a meeting has a casting and a deliberative vote in the event of an equality of votes.

A member may not miss two consecutive meetings of the Council without its permission.

The executive committee of Council shall be the President and two other members of Council designated by the Council and this executive committee shall exercise all the powers and perform all the functions of the Council between meetings. The executive committee may not change any decision of the Council and although its decisions are binding on the Council, they may be set aside by the Council.

The Council may establish other committees.

The Council shall appoint a Registrar for the purposes of the Act.

The Council may institute an inquiry into the conduct of a person who is registered or deemed to be registered

under the Act, or into an alleged act or omission by such a person in the practising of his profession or into an alleged contravention of the Act or the rules by such a person and the procedure at or for such an inquiry is laid down.

The Act confers disciplinary powers on the Council.

E. Delegated Powers:

The Act confers power on, assigns functions to and imposes duties on the Registrar appointed by the Council. These powers, functions and duties may be delegated to staff members acting under the control and direction of the Registrar.

Paraphrased by Dr. C.M. Veary

BOOK REVIEW — BOEKRESENSIE

RADIOGRAPHIC TECHNIQUE IN VETERINARY PRACTICE

JAMES W. TICER D.V.M., Ph.D.

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Price R109,50

The author of this book is a former Professor of Radiology of the University of Florida who left the rewards and frustrations of teaching to establish a consultative and referral practice in veterinary radiography and radiology. He therefore understands the needs of those to whom this book is addressed, veterinary students, practitioners and their technical assistants. The declared purpose of the book is to provide these people with a source of information on radiographic technique in veterinary practice.

The book is presented in 3 sections, the first entitled "Physical Principles", the second "Radiographic Positioning and Technique in Small Animals" and the third "An Atlas of Radiographic Positioning and Technique in Large Animals".

The first few chapters of Section I deal clearly with the theory of X-ray production, image formation and image recording. Here is included information about X-ray tubes, collimators, cassettes, intensifying screens, grids, film types and fluoroscopic screens. The author does not wish to burden his readers with unnecessary detail but I think that a little more information on the correct use of grids would have been helpful. Incorrect use of focussed grids especially can present many hazards for the inexperienced.

The chapter on dark-room theory and techniques is excellent, including as it does a section on the causes of unsatisfactory radiographs produced by both manual and automatic processing of films.

A comprehensive chapter on the selection of exposure factors and formulation of technique charts should take the guesswork out of radiography even for adherents of the "point and shoot" method. Useful exposure charts for both small and large animals on both small and larger machines are included here and can provide a useful starting point.

Planning and equipping a radiology department is dealt with, as is radiation protection. This latter chapter is necessary, factual, and sensible. There is a fascinating chapter on the costing and setting of fees for radiographs and Section I ends with information on making copies of radiographs, and on making slides from radiographs for projection purpose.

Section II and III constitute the atlases of positioning in small and large animals respectively. The importance of these Sections is underlined by the author's note that faulty preparation and positioning of patients are the major causes of radiographs which are not of diagnostic quality.

The format is similar throughout both these sections, examinations being arranged according to regional anatomy. The positioning of the patient is fully described verbally and shown clearly on a photograph. The photograph of the resulting radiograph is accompanied by an overlay line drawing illustrating the normal radiography anatomy. Sections II and III thus combine an atlas of positioning with an atlas of radiographic anatomy. Praise for this useful and instructive method of presentation cannot be too high.

Contrast media techiques are fully described in Section II. Here the author acknowledges his debt to the various specialists who have each contributed a chapter in their own field. These contributions greatly enhance the book. Materials and methods are discussed, the normal appearance of these studies described and helpful advice is offerred in dealing with complications which may occur.

Patients in Section I are shown anaesthetized where necessary or restrained without manual aid in compliance with regulations pertaining in U.S.A.

A chapter on techniques in avian radiography closes Section II.

In Section III the model patient is the horse and the examinations described are those which can be performed with modest equipment on the standing, conscious animal. Modern anatomical terminology is used throughout the book, but the author is kind to the older veterinarian and in this Section includes the previous terminology where this is helpful.

Throughout the book excellent bibliographies are provided at the end of each chapter. For example, over 70 references are listed at the close of the chapter on contrast urography.

This beautifully produced book extends to 511 pages and its local prices of approximately R110 reflects its quality.

The purchase of this book can be confidently recommended for its usefulness and excellence will not easily or speedily be surpassed.

I.E. Gordon